WATER SUPPLY

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INTRODUCTION AND SUMMARY OF CONCLUSIONS

This assessment analyzes the potential impacts on groundwater resources by the proposed Hidden Hills Solar Electric Generating System (HHSEGS). Refer to the **Soil and Surface Water** section of this Preliminary Staff Assessment for a detailed analysis of the potential impacts on water quality and hydrology.

Energy Commission staff evaluated the potential impacts to: local groundwater supplies, local well owners, groundwater dependent habitats, and compliance with all applicable laws, ordinances, regulations and standards (LORS) and state policies. Staff concludes that construction and operation of the proposed HHSEGS project would increase groundwater consumption in an over-drafted groundwater basin. The project could potentially have significant cumulative impacts to the groundwater basin and direct impacts to local groundwater supplies and biological resources. However, these impacts may be mitigated to levels that are less than significant if the mitigation measures proposed in the Application for Certification (AFC) and staff's proposed conditions of certification are implemented. Additionally, the project would comply with applicable LORS and state policies if such mitigation measures are implemented.

Based on the assessment of the proposed Hidden Hills Solar Electric Generating System (HHSEGS), Energy Commission staff concludes that:

1. The proposed project would exacerbate overdraft conditions in the Pahrump Valley groundwater basin. **WATER SUPPLY-1** would require the proposed project to mitigate for its groundwater use by offsetting it with groundwater pumping reductions that would constitute a real water savings for the basin. Such mitigation could only be effective if pumping reductions are associated with a real pumping history and could not be replaced by other unused water rights.

2. Potential project impacts must be consistent with those analyzed. Staff thus proposes Condition of Certification **WATER SUPPLY-2** which limits the applicant's water use and **WATER SUPPLY-3,** which requires the applicant to construct and report well-related information in accordance with appropriate LORS and install metering devices to ensure accurate reporting of water use.

3. The proposed project pumping could exacerbate water level declines in the project vicinity. To prevent such declines from becoming significant impacts, staff proposes a monitoring plan: **WATER SUPPLY-4** monitors groundwater conditions for potential impacts on existing neighboring wells, groundwater dependent vegetation, the Stump Spring Area of Critical Environmental Concern (ACEC), and groundwater quality. The monitoring is designed to prevent potential impacts to groundwater dependent vegetation, among the other concerns noted above, and therefore also compliments conditions recommended in the **Biological Resources** section. **WATER SUPPLY-5** mitigates for pumping induced drawdown impacts in existing wells. **WATER SUPPLY-6** recommends a plan to monitor land subsidence as a

result of declining water levels and aquifer dewatering that potentially may occur as a result of pumping.

4. Given the lack of evidence for a hydraulic connection, the relatively large intervening distance (about 20 miles), and uncertainty in potential flow barriers and permeability contrasts within the subsurface it would be speculative to conclude that project pumping would adversely affect the Amargosa River. There is no available data that identifies groundwater flow paths or confirms a hydraulic connection between PVGB and the Amargosa River, so the water consumed by project pumping may or may not be a source of inflow to the Amargosa River. Although staff concludes that a significant impact due to project pumping is unlikely, **WATER SUPPLY-1** which requires an offset of project water use in the PVGB would ensure there is likely no net overall change in subsurface outflow from the PVGB that might affect the Amargosa River.

5. Staff recommends Condition of Certification **WATER SUPPLY-7**, which would require the applicant to obtain a permit to operate a non-transient, non-community water system with the Inyo County Environmental Health Department at least sixty (60) days prior to commencement of construction at the site. This condition would ensure that the applicant meets all provisions of Title 22, Section 3 to provide a suitable domestic water supply.

With implementation of the Conditions of Certification listed below, the proposed HHSEGS project would comply with all applicable LORS, and would not result in any unmitigated significant impacts related to water supply resources.

LAWS, ORDINANCES, REGULATION, AND STANDARDS (LORS)

The following federal, state, and local environmental LORS in **WATER SUPPLY Table 1** listed for the HHSEGS project and similar facilities require the best and most appropriate use and management of groundwater resources. Additionally, the requirements of these LORS are specifically intended to protect human health and the environment. Actual project compliance with these LORS is a major component of staff's determination regarding the significance and acceptability of the HHSEGS project with respect to the use and management groundwater resources.

WATER SUPPLY Table 1
Laws, Ordinances, Regulations, and Standards

Federal LORS	
-	-
State LORS	
California Constitution, Article X, Section 2	This section requires that the water resources of the state be put to beneficial use to the fullest extent possible and states that the waste, unreasonable use or unreasonable method of use of water is prohibited.
California Water Code Section 13240, 13241, 13242, 13243, & Water Quality Control Plan for the Lahontan Region (Basin Plan)	The Basin Plan establishes water quality objectives that protect the beneficial uses of surface water and groundwater in the Region. The Basin Plan describes implementation plans and other control measures designed to ensure compliance with statewide plans and policies and provides comprehensive water quality planning. The following chapters are applicable to determining appropriate control measures and cleanup levels to protect beneficial uses and to meet the water quality objectives: Chapter 2, Present and Potential Beneficial Uses; Chapter 3, Water Quality Objectives, and the sections of Chapter 4, Implementation, entitled "Requirements for Site Investigation and Remediation," "Cleanup Levels," "Risk Assessment," "Stormwater Problems and Control Measures," Erosion and Sedimentation," "Solid and Liquid Waste Disposal to Land," and "Groundwater Protection and Management."
California Code of Regulations, Title 23, Division 3, Chapter 30	This chapter requires the submission of analytical test results and other monitoring information electronically over the internet to the SWRCB's Geotracker database.
State Water Resources Control Board 2003-003-DWQ	This general permit applies to the discharge of water to land that has a low threat to water quality. Categories of low threat discharges include piping hydrostatic test water.
California Code of Regulations, Title 22	Title 22, Division 4, Chapter 15 specifies Primary and Secondary Drinking Water Standards in terms of Maximum Contaminant Levels (MCLs). These MCLs include total dissolved solids (TDS) ranging from a recommended level of 500 milligrams per liter (mg/l), an upper level of 1,000 mg/l and a short term level of 1,500 mg/l. Other water quality MCLs are also specified, in addition to MCLS specified for heavy metals and chemical compounds.
California Safe Drinking Water Act	Requires public water systems to obtain a Domestic Water Supply Permit. The California Safe Drinking Water Act requires public water systems to obtain a Domestic Water Supply Permit. Public water systems are defined as a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out the year. California Department of Public Health (CDPH) administers the Domestic Water Supply Permit program, and has delegated issuance of Domestic Water Supply Permits for smaller public water systems in Inyo County to the County. Under the Inyo County Code Title 3, 5.15-6 Division 3, Chapter 6, Public Water Supply Systems, the County Department of Environmental Services monitors and enforces all applicable laws and orders for public water systems with less than 200 service connections. The proposed project would likely be considered a non-transient, non-community water system.
California Code of Regulations, Title 20,	The regulations under Quarterly Fuel and Energy Reports (QFER) require power plant owners to periodically submit specific data to

Division 2, Chapter 3, Article 1	the California Energy Commission, including water supply and water discharge information.
Local LORS	
Inyo County General Plan	The General Plan includes water resources related goals and implementation measures to protect water resources from overutilization, degradation, and export. Applies to project use of groundwater.
Inyo County Code Title 14, Chapter 14.28	This chapter of the county code defines what is required of water well owners and operators in Inyo County. This chapter requires that well owners pay permit fees to the county for well construction permit review, meet county well construction specifications, and properly destroy abandoned wells.
Inyo County Code Title 7, Section 7.52.090	Fees related to small water systems. Requires that every applicant for and every holder of an environmental health services permit to operate a small water system in Inyo County shall, upon application and annually, respectively, pay a fee.
Inyo County Code Title 7, Section 7.52.070	This section of the county code defines fees required of water well owners and operators in Inyo County.
Inyo County Code Title 7, Section 7.52.060	This section of the county code defines fees required of onsite waste water disposal system owners and operators in Inyo County.
State Policies and Guidance	
Integrated Energy Policy Report (Public Resources Code, Div. 15, Section 25300 et seq.)	In the 2003 Integrated Energy Policy Report (IEPR), consistent with SWRCB Policy 75-58 and the Warren-Alquist Act, the Energy Commission adopted a policy stating they would approve the use of fresh water for cooling purposes by power plants only where alternative water supply sources and alternative cooling technologies are shown to be “environmentally undesirable” or “economically unsound.”
State Water Resources Control Board Res. No. 68-16	The “Antidegradation Policy” mandates that: 1) existing high quality waters of the State are maintained until it is demonstrated that any change in quality would be consistent with maximum benefit to the people of the State, would not unreasonable affect present and anticipated beneficial uses, and would not result in waste quality less than adopted policies; and 2) requires that any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters, must meet WDRs which would result in the best practicable treatment or control of the discharge necessary to assure that: a) a pollution or nuisance would not occur and b) the highest water quality consistent with maximum benefit to the people of the state would be maintained.
State Water Resources Control Board Res. 75-58	The principal policy of the SWRCB that addresses the specific siting of energy facilities is the Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling (adopted by the Board on June 19, 1976, by Resolution 75-58). This policy states that fresh inland waters should only be used for power plant cooling if other sources or other methods of cooling would be environmentally undesirable or economically unsound.
State Water Resources Control Board Res. No. 88-63	States that all groundwater and surface water of the State is considered to be suitable for municipal or domestic water supply with the exception of those waters that meet specified conditions.
State Water Resources Control Board Res. 2005-0006	Adopts the concept of sustainability as a core value for State Water Board programs and directs its incorporation in all future policies, guidelines, and regulatory actions.

The California Safe Drinking Water and Toxic Enforcement Act	The California Health & Safety Code Section 25249.5 et seq. prohibits actions contaminating drinking water with chemicals known to cause cancer or possessing reproductive toxicity. The RWQCB administers the requirements of the act.

Water Rights

The proposed HHSEGS site overlies the Pahrump Valley groundwater basin which is located within both California and Nevada. California and Nevada have different laws governing a landowner's right to use groundwater. It is important therefore to explain the differences between the two systems and their influence on mitigation options for the proposed HHSEGS project. Below is a summary of the water rights system in each state.

California- The California Constitution requires that water be used for beneficial purposes. In non-adjudicated water basins, California law does not require groundwater users to obtain a water right. No agency has comprehensive authority to regulate groundwater statewide (Bryner and Purcell, 2003). Overlying landowners generally have the right to pump and use as much groundwater as needed as long it is put to a reasonable and beneficial use. Through court decisions and precedent, appropriation of groundwater for use outside a groundwater basin has been allowed and established in the form of an appropriative right. However, these rights are usually subordinate to the overlier's rights. In basins where a law suit is brought to adjudicate water use, the overlier's groundwater rights and appropriators are determined by the court. The court also decides 1) who the pumpers are, 2) how much water the pumpers can extract, and 3) who the watermaster would be to ensure the basin is managed in accordance with the court decree. The California portion of the Pahrump Valley basin is not adjudicated and no rights have been apportioned in accordance with a court decree.

Nevada- The Nevada Constitution requires that water be used for beneficial purposes. Underground waters belong to the public and are subject to appropriation. The Nevada Division of Water Resources has the sole authority to regulate groundwater use in the state (Bryner and Purcell, 2003). Beneficial use also extends to include the appropriative rights system of water allocation such that a user must demonstrate an actual beneficial use of water. Users cannot speculate on water rights or hold onto water rights that they do not intend to use in a timely manner. If water right holders do not use the water in a timely manner, they lose such right (Nevada State Engineer, 2012).

SETTING

Regional setting

The HHSEGS site is located in Pahrump Valley, which is located in the southern extent of the Great Basin. The Great Basin is a large topographically closed drainage basin that extends primarily throughout Nevada and western Utah (**WATER SUPPLY Figure 1**). The Great Basin is characterized by interior drainages with lakes and playas, and series of horst and graben structures (subparallel, fault-bounded ranges separated by down-dropped basins). The down dropped basins are typically filled with alluvium and playa deposits shed from the adjacent mountain ranges.

Pahrump Valley

The Pahrump Valley is a topographically closed basin that straddles the California/Nevada border (**WATER SUPPLY Figure 2**). It is approximately 30 miles wide and about 40 miles long, and is bounded on the northeast and southwest by fault block mountain ranges comprised of carbonate and clastic rocks (Spring Mountains and the Resting Spring and Nopah ranges), and a tertiary granitic pluton in the south (Kingston Range). Within these boundaries is a 650 square mile basin filled with alluvium to a depth of about 2,000 feet. The alluvium overlies Paleozoic carbonate rocks that are typically folded, faulted, and fractured.

Groundwater associated with the Pahrump Valley basin fill forms a local groundwater-flow system, whereas groundwater associated with the underlying fractured carbonate rocks is part of a larger regional groundwater system. The connection between the relatively shallow local groundwater in the valley basin fill and the deeper regional groundwater (often referred to as the "carbonate aquifer") is unclear. Groundwater in the Pahrump Valley basin fill is known as the Pahrump Valley Groundwater Basin (PVGB) (DWR 2004). The PVGB is principally recharged by precipitation falling in the Spring Mountains, and the basin supports several springs and numerous extraction wells. In the carbonate aquifer, groundwater moves to the northwest and into Ash Meadows and to the southwest through the Nopah Range. Little is known about the quantity and relative proportions of local and regional groundwater discharged by the various sinks in the valley and springs and rivers down gradient to the valley.

The Pahrump-Stewart Valley Fault Zone runs approximately parallel to the California-Nevada State Line and divides the Pahrump Valley into two groundwater sub-basins (**WATER SUPPLY Figure 2**). In the northwest, limited water levels measured in basin fill wells suggest that the fault zone does not impede groundwater flow through that portion of the valley (Comartin, 2010). In contrast, in the southwest, where the project site is located, the fault may significantly impede groundwater movement out of the valley. For example, regional groundwater-flow modeling conducted by the USGS indicated an effective hydraulic conductivity across the fault of 1.8×10^{-7} feet per day, which is several orders of magnitude smaller than the hydraulic conductivity of the adjacent alluvium (Faunt et al., 2004a). Malmburg (1967) also noted a steeper gradient along this fault zone as shown in the mapping of potentiometric contours. Given this characterization, groundwater flow across the fault and into California in the southern part of the valley could be limited by the low permeability fault zone.

The Amargosa River is a unique perennial stream that is believed to be supported by the regional groundwater flow system. It originates in the mountains of southwestern Nevada and flows south and west, terminating in the sinks and playas of Death Valley. The river is located 15 to over 20 miles southwest of the Pahrump Valley where it flows along the western flank of the Resting Spring and Nopah Mountain Ranges. Despite the large drainage area, most of the river and its tributaries are ephemeral. The perennial reaches are supported primarily by groundwater discharge from the local alluvial and deeper regional carbonate aquifers. As shown in **WATER SUPPLY Figure 2** the USGS

inferred ground-water throughflow moves northwesterly out of PVGB through the Nopah and Resting Spring Range, toward the river and mixes with ground water flowing southward from Alkali Flat. Groundwater throughflow out of the southern part of the valley toward the river is likely less significant as a result of the fault zone (Faunt et al., 2004b).

Wells and Water Levels

In the last 100 years, the PVGB has been the subject of multiple hydrogeologic reports, but none of the reports focused on the southern part of the basin where the proposed project is located. Pahrump Valley historically had abundant groundwater reserves, but pumping throughout the 1900s caused a steady rate of water table decline in the alluvial aquifer. **WATER SUPPLY Figure 3** shows the available long-term water levels records for wells located in the PVGB, which are concentrated at the northern end of the basin. The well data suggest a general decline in water levels in the northern part of the basin between 1950 and 2000 (Buqo, 2004). The observed decline in these wells of record has averaged about one foot per year. In contrast, water level data for the southern half of the basin is relatively scarce. The proposed HHSEGS site is bordered by domestic wells located primarily to the south in the community of Charleston View. Most of these wells were drilled after 1950. The available water level data from the southern half of the PVGB was used to construct a map of the potentiometric surface shown in **WATER SUPPLY Figure 4**; the explanation for this map is included as **WATER SUPPLY Figure 5**.

Basin Balance

Water budget estimates reported by Comartin (2010) indicate that the Pahrump Valley receives approximately 22,000 AFY of recharge from precipitation falling in the Spring Mountains. Groundwater outflows include evapotranspiration, southwesterly underflows into California, and groundwater pumping. Comartin (2010) estimated evapotranspiration at about 10,000 AFY, but did not provide an estimate for underflow and pumping; underflow is thought to vary primarily with the basin pumping stresses (Comartin, 2010).

Reported groundwater extractions are substantially greater than estimated safe yield for the PVGB. The Nye County Water Resources Plan states that the safe yield of the basin is between 12,000 and 19,000 AFY (Buqo, 2004). On the Nevada side of the PVGB, 69,000 AFY of groundwater extractions are permitted, but the actual reported groundwater use is substantially less than the permitted extraction rate. Reported groundwater extractions ranged from a maximum of 47,100 acre-feet (1968) to a minimum of 23,000 acre-feet (2000). These reported annual extraction rates only include the pumping covered by water rights issued by the Nevada State Engineer, and may be less than actual groundwater use because pumping by domestic wells can only be estimated. Using the Nevada State Engineer's estimate for residential water use of 0.5 AFY per residence (well), domestic water use estimated for 2011 was 5,553 AF (Nevada State Engineer, 2012).

In the California part of the basin, there are approximately 68 residents and 34 residential structures within six miles of the proposed project site. Most of these water

users are part of the Charleston View development. Staff estimated residential water use by this development at about 17 AFY.

Subsidence

During the last 100 years, the northern Pahrump Valley basin has experienced land subsidence due to water-level declines associated with excessive groundwater pumping (Buqo, 2004; Malmburg, 1986). The valley center is particularly susceptible to subsidence because of the high clay content throughout the saturated thickness of the valley-fill aquifer. Subsidence has not been monitored, but **WATER SUPPLY Figure 6** shows a map of the estimated extent of historical subsidence based on the pumping distribution, water level declines, and alluvial clay content in subsurface deposits. Most subsidence would typically occur where groundwater pumping and water-level declines were greatest.

See the **Geology and Paleontology** section of this **FSA** for an analysis and further description of threats posed by subsidence unrelated to groundwater pumping.

Springs and Groundwater-Dependent Vegetation

Certain types of plants in arid regions, such as mesquite, cottonwoods, and willow trees, often rely on groundwater for survival and occur only where the water table is shallow. These plants are called phreatophytes. Pumping groundwater in those areas can adversely impact phreatophytes by lowering water levels in the root zone. Groundwater pumping in the northern PVGB was associated with significant declines in mean annual discharge at Bennetts and Manse Springs (Belcher et al., 2004). **WATER SUPPLY Figure 7** shows the trends in spring discharge from these two springs between 1870 and 1980.

Malmburg (1967) mapped mesquite trees along multiple creek drainages 3 to 5 miles northeast, east, and southeast of the HHSEGS project, but primarily on the Nevada side of the Pahrump-Stewart Valley Fault System, as shown in **WATER SUPPLY Figure 8**. In the 1990s, the US Bureau of Land Management (BLM) conducted surveys and mapped the groundwater-dependent species in the region. **WATER SUPPLY Figure 9** shows the areas mapped by BLM (BLM, 2006).The BLM map shows more extensive vegetation occurrence than Malmburg's (1967) map, but it is not clear whether the difference stems from different mapping methods and categories or from real changes in vegetation on the landscape.This figure also shows the location of all known springs within 6 miles of the project site.

Because of their need for relatively shallow groundwater conditions, phreatophytes are also associated with areas that have seeps and springs. One of the areas mapped as having phreatophytes is located 4-miles east of the HHSEGS project site within the BLM-designated Stump Spring Area of Critical Environmental Concern (ACEC).The Stump Spring ACEC is protected for its biological and cultural resource values that include mesquite coppice dunes and mesquite washes. Declining water levels in the PVGB has therefore made protection of this area a priority (BLM, 2006). **WATER SUPPLY Figure 10** shows the proposed site relative to the mapped ACEC boundary

and a monitoring well that has been installed to measure water level changes at Stump Springs.

Faults

Numerous faults are inferred in the immediate vicinity of the proposed project site. Some faults are inferred from topographical evidence of fault scarps and others from geophysical studies. The faults bound blocks that step up east along and into the Spring Mountain Range. All of the faulting in the region is part of the regional Amargosa-Pahrump fault system, which trends northwest - southeast. **WATER SUPPLY Figure 9** shows the inferred faults in the vicinity of the project site (Workman et al., 2002). The USGS modeled the effective hydraulic conductivity across the fault at $1.8x10^{-7}$ feet per day, which is several orders of magnitude smaller than the hydraulic conductivity of the adjacent alluvium (Faunt et al., 2004). Springs appear to lie along or in close proximity to the inferred fault traces. It is common for faults to create spring conditions because they form hydraulic barriers along the displaced rocks and sediments causing groundwater to flow to the surface, or displacement exposes water bearing sediments and flow discharges at the surface. The mesquite coppice dunes and washes appear to be aligned along faults where shallow groundwater may occur.

For further discussion of the regional faul system, see the **GEOLOGY AND PALEONTOLOGY** section of this FSA.

Water Quality

The California Department of Water Resources (DWR) describes groundwater quality in the PVGB as suitable for all beneficial uses. The water quality varies in character from calcium-magnesium-bicarbonate to magnesium-calcium-bicarbonate, and the reported total dissolved solid (TDS) concentrations range from 145 to 540 mg/L (DWR, 2004).

The Nye County Water Resources Plan describes the groundwater quality in the PVGB as good. This Plan notes however that the northern part of the valley contains a very high density of septic systems and could benefit from community sewage treatment infrastructure. There are 33 land sections containing more than 100 septic systems, which increase the risk of domestic well contamination (Buqo, 2004).

There is limited data on water quality in the southern part of the basin. The Charleston View community located just south of the project site has 12 documented wells that appear to be primarily for domestic use, which suggests that groundwater is of acceptable quality for most uses. Recent water quality analyses from wells on the project site show that the groundwater quality is relatively low in Total Dissolved Solids (between 250 and 360 ppm, based on the applicant's 2011 and 2012 data) and has a bicarbonate character. There are approximately 68 residents and 34 residential structures within six miles of the proposed project in California. These residences all use septic systems for on-site wastewater disposal. Using a typical factor of about 70 gallons per day per person, for non-consumptive use and return flow through these systems, the Charleston View homes located in a 5 square mile area could be percolating up to 5 AFY of sanitary wastewater (Nishikawa, et al., 2003).

Water Use

Six water supply wells would be drilled as part of the HHSEGS project. Two wells would be required at each of the two power blocks and two more would be installed at the administration complex. Each pair of wells consists of a main well and a back-up well. Wells at the power block would supply make-up water, mirror wash water, and water for domestic uses.

Under operating conditions, each power block would require between 30 to 50 gallons per minute (gpm), and domestic water use of about 3.5 gpm (average water use of almost 45 gpm per power block). The operating plant water use would therefore average about 90 gpm, which equates to an annual average use of about 140 acre-feet per year (AFY). If the project were to operate for 30 years, it would pump a total of 4,200 Acre Feet (AF).

Construction water use could be as high as 288 AFY for almost three years. If permitted, construction would take place beginning in the second quarter of 2013 and be completed in the fourth quarter of 2015 (29 months). The total pumping for this period would be 696 AF.

Total combined pumping for construction and operation would be about 4,900 AF.

Each power block would have a 250,000 gallon raw water tank. Of that capacity, 100,000 gallons would be used in power plant operation and the other 150,000 gallons would be stored for emergency fire water.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This section provides an evaluation of the expected direct, indirect, and cumulative impacts to groundwater resources that would be caused by project construction, operation, and maintenance. Staff's analysis of potential impacts consists of a description of the potential effect, an analysis of the relevant facts, and application of the threshold criteria for significance to the facts. If mitigation is warranted, staff provides a summary of the applicant's proposed mitigation and a discussion of the adequacy of the proposed mitigation. If necessary, staff presents additional or alternative mitigation measures and refers to specific conditions of certification related to a potential impact and the required mitigation. Mitigation is designed to reduce the effects of potential significant project impacts to a level that is less than significant.

Staff concluded that the depletion or degradation of groundwater resources, including its beneficial uses, are the most significant impacts associated with the proposed project. The thresholds of significance for these issues are discussed below.

Water Resources

Staff evaluated the potential of the project's proposed water use to cause a substantial depletion or degradation of groundwater resources for all beneficial uses. Staff considered compliance with the LORS and policies presented in **WATER SUPPLY**

Table 1 and whether there would be a significant California Environmental Quality Act (CEQA) impact. Compliance with LORS and policies includes the Energy Commission and State Water Resources Control Board policies against using freshwater for power plant cooling unless other sources or other methods of cooling would be environmentally undesirable or economically unsound. A discussion of the applicable policies is contained in the "Water Use LORS and State Policy Guidance" subsection of this FSA section.

To evaluate if significant CEQA impacts to groundwater resources would occur, the following criteria were used.

a) Would the project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume (deplete groundwater storage)?

b) Would the project contribute to any lowering of groundwater levels and impact the production rate of pre-existing wells to a level which would not support existing or planned uses for which other permits have been granted or cause physical damage to the well?

c) Would the project contribute to any lowering of the groundwater levels and affect protected species or habitats?

d) Would the project substantially degrade groundwater quality?

Where a potentially significant impact was identified, staff or the applicant proposed mitigation to ensure the impacts would be less than significant.

DIRECT IMPACTS

This section discusses potential impacts from project groundwater pumping in the PVGB. These include whether the project would substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume (deplete groundwater storage). During the next 33 years, almost 4,900 acre-ft of groundwater would be consumed from a basin with declining water levels and reported use levels that exceed the estimated sustainable yield.

Basin Water Levels

The volume of groundwater stored in a basin varies with changes in water inflows and outflows. Groundwater storage and well water levels increase when inflow exceeds outflow. Conversely, groundwater storage and water levels decrease when inflow is less than outflow. Significant adverse impacts can occur when groundwater storage perpetually declines, which include the increase in extraction costs, costs related to well deepening or replacement, land subsidence, water quality degradation, and elimination of habitat associated with springs and shallow groundwater levels.

The PVGB has experienced significant declines in groundwater levels and spring discharge during the last 100 years. The northern half of the valley has experienced average water level declines of approximately one foot per year since the 1950s (see **WATER SUPPLY Figure 3**) (Buqo, 2004). Data going back to the 1950s is limited for

the southern half of the Valley, but staff obtained water level records for two southern basin wells reported by the United States Geological Survey that indicate a long-term decline similar to that observed in the north (the Hidden Hills irrigation well and the Orchard well).

WATER SUPPLY Figure 11 shows the water level record for the Hidden Hills irrigation well. This well experienced a significant decline in the 1980s and has not recovered. Since the 1970s the water levels have steadily declined by about 0.25 feet per year.

WATER SUPPLY Figure 12 shows the water level record for the Orchard well.The Orchard well has also experienced a steady decline in water levels since 1959. The observed long-term trend in this well is about 0.37 feet per year.

Staff obtained relatively detailed water level records from the Nye County Nuclear Waste Repository Project Office (NWRPO[1]) for several other wells located in the southern portion of the PVGB. These wells have relatively recent data records, which begin in November 2005 and end in November 2011. Staff utilized these water level records to calculate average water level changes in the southern PVGB and establish baseline conditions for the impact assessment.

Staff employed a USGS program (Helsel, 2006) to compute the Mann-Kendall test for trend and Sen's slope (Sen, 1968).The Mann-Kendall test is routinely employed in the environmental sciences to determine if the data exhibit a statistically significant trend because it is not heavily influenced by outliers or missing data. If the data does exhibit an upward or downward trend, the Sen's slope statistic determines the rate of increase or decrease represented by the data. **WATER SUPPLY Figures 11** through **16** shows the water level data and estimated trends for PVGB wells.

The statistical calculations are summarized in **WATER SUPPLY Table 2** and **WATER SUPPLY Table 3**. Results indicate that the water levels for all the wells have statistically significant downward trends at the 95-percent confidence level (significance level, $\alpha = 0.05$). Staff utilized the statistical results to consider water level trends on either side of the California-Nevada state line, which corresponds to the low permeability Pahrump-Stewart Valley Fault Zone. Staff chose the median trend to characterize the long-term water level changes in California and Nevada wells separately; the median is utilized because it is less influenced by outliers (Nevada Department of Transportation (NDOT)). **WATER SUPPLY Table 2** shows that the median water level decline calculated in the California wells is 0.23 feet per year (ft/yr); **WATER SUPPLY Table 3** shows that the median water level decline observed in the Nevada wells on the other side of the fault zone is 1.15 feet per year.

[1]http://www.nyecounty.com/LSN/index/EWDP/water_data.htm

WATER SUPPLY Table 2
Groundwater Level Trends in Southern Pahrump (CA Wells)

Well Name	Years	Number of Records	Median,ft/yr
Dry Lakebed	2005 - 2011	46	0.00
Old Orchard	2005 - 2011	44	-0.23
Quail	2005 - 2011	45	-0.31
Stateline	2005 - 2011	45	-0.24
		Arithmetic Mean	**-0.19**
		Median	**-0.23**

WATER SUPPLY Table 3
Groundwater Level Trends in Southern Pahrump (NV Wells)

Well Name	Years	Number of Records	Median,ft/yr
Beyond Sherrys	2005 - 2011	46	-1.91
NDOT	2005 - 2011	32	-7.00
Hidden Hills Irrigation	2005 - 2011	45	-0.39
Jeep Trail	2005 - 2011	44	0.60
		Arithmetic Mean	**-2.18**
		Median	**-1.15**

Overdraft can be characterized by groundwater levels that decline over a period of years and never fully recovers, even in wet years. In the PVGB, water levels have been declining both north and south of the fault zone for years. Project pumping and increased groundwater consumption would exacerbate water level declines and reductions in groundwater storage. The applicant also acknowledges that project pumping would substantially deplete groundwater supplies in the PVGB and exacerbate ongoing overdraft conditions. The applicant therefore proposes to offset the impact through acquisition and retirement of water rights in an amount equal to the proposed project pumping. Staff believes this could be appropriate mitigation if it is shown that the water rights acquired offset actual active groundwater use in the PVGB. Staff also believes it is possible there are other methods that could be implemented to offset project pumping such as developing alternative supplies, funding water conservation programs, or capturing and recharging flood flows that would otherwise drain to the playa and evaporate (See the **Soils and Surface Water** section and **SOILS-5** and **SOILS-6** for further discussion). Staff recommends adoption of Condition of Certification **WATER SUPPLY-1** which requires the project owner to develop and implement a plan prior to project construction and provide water use offset within the PVGB that is equal to project pumping, thereby ensuring no new net increase in groundwater consumption.

To ensure that the water use analyzed is consistent with that used by the proposed project, staff proposes Condition of Certification **WATER SUPPLY-2**. This condition would limit project pumping to an average of 288 acre-feet per year during the 29 months of construction and to 140 acre-feet per year for project operations.

Furthermore, this condition requires that water use is metered and reported consistent with these limitations. Staff also proposes Condition of Certification **WATER SUPPLY-3** to ensure that project wells are constructed to state standards.

Aquifer Tests

The depth and extent of water level drawdown in and around a pumping well is determined by the pumping rate, aquifer transmissivity and aquifer storativity. Well hydraulic equations used to estimate drawdown are dependent on the values of these parameters. The drawdown calculated using these equations is used by staff to evaluate the potential impact on water resources. Information on aquifer parameter values in the vicinity of the site is limited. Staff obtained two reported transmissivity estimates and one storativity estimate from a local 1966 aquifer test (HHSEGS 2011a). These values are included in **WATER SUPPLY Table 4** below.

In February 2012 the applicant conducted an aquifer test to further evaluate site aquifer water transmitting and storage properties. Staff and other interested parties reviewed and commented on the results of the test and noted several deficiencies with the methodology. There has been further disagreement between the applicant and staff regarding the characterization of the aquifer system. Specifically, there is disagreement in regard to the water sources extracted by the pumped wells, the adequacy of the water level monitoring network, and the magnitude and extent of expected pumping impacts manifested in the aquifer system. Although staff disagreed with the applicant on how the data should be used to estimate local and regional aquifer response to pumping, staff acknowledges the results provide additions to a limited dataset. The applicant also recently completed another aquifer test in October 2012 while staff was completing this analysis for the FSA. Staff completed a preliminary review of the results and found that the values were within the range of values from the February 2012 aquifer test. The applicant's transmissivity and storativity estimates from the February 2012 aquifer test are included below in **WATER SUPPLY Table 4**.

In **WATER SUPPLY Table 4**, staff also identified the minimum and maximum transmissivity and storativity estimates. The range in these values suggests there is significant variability in aquifer characteristics at and near the site. This variability translates into uncertainty in estimated impacts from the project. In order to capture the possible range in pumping impacts, staff employed the range of values to represent best- and worst-case estimates of the potential impact (minimum and maximum estimated drawdown, respectively).

WATER SUPPLY Table 4
Estimates of Aquifer Properties

Storage	Transmissivity (gpd/ft)	Source, Method
NA	4,675	AFC (Broadbent and Associates, Inc. 2003)
0.064	7,225	AFC (Geotechnical Consultants, Inc. 1966)
0.0014	1,634	Applicant, estimate from Feb 2012 pump test, MW-1, Hantush
0.0067	6,914	Applicant, estimate from Feb 2012 pump test, MW-5, Hantush
0.0028	1,175	Applicant, estimate from Feb 2012 pump test, MW-3, Hantush
0.0028	6,914	Applicant, estimate from Feb 2012 pump test, MW-2, Hantush
0.0031	660	Applicant, estimate from Feb 2012 pump test, MW-4, Hantush
0.013	**4,171**	**Average**
0.064	**7,225**	**Max**
0.0014	**660**	**Min**

Groundwater-Dependent Vegetation and Stump Springs

Staff considered whether the proposed pumping could impact groundwater dependent mesquite vegetation located about 1.5 miles from the project supply wells and at Stump Spring ACEC (**WATER SUPPLY Figure 10**). The presence of mesquite vegetation generally indicates a relatively shallow water table, and therefore may be impacted by project groundwater consumption and water level declines. In the Biological Resources section of this FSA, staff discusses the unique value of this vegetation and why it should be protected from the potential effects of project pumping.

Stump Springs is located about 4.5 miles from the project. It supports an extensive area of mesquite vegetation. Stump Springs is an intermittent spring and lacks a reliable flow record, but it was reportedly flowing in 1845 (BLM, 2006) and also by the USGS in 1919 (Grover, 1919). As discussed in the **Biological Resources** section, BLM reports that Stump Spring is currently discharging and supports three shallow, seasonal pools that range between 30 and 70 feet long, and one to two feet deep. BLM has constructed a monitoring well in the ACEC known as the Stump Springs monitoring well. The well is located about one-half mile east of the actual spring location and currently has a water level of 28 feet below ground surface (bgs).

The mechanism controlling Stump Spring discharge is not well understood. Stump Spring is located along an inferred fault structure, assumed to be part of the Pahrump-Stewart Valley Fault Zone, or Stateline Fault System (Guest et al., 2007). The opportunity may exist for confined water to rise to the surface along these fault

structures, thereby creating a spring. This faulting has also resulted in terracing along the eastern alluvial slope of Pahrump Valley, and these terraces provide the opportunity for the water table to intersect the land surface and discharge groundwater thereby creating a spring. Additionally, the 50 foot thick clay layer mapped by Grover (1919) may confine groundwater and create artesian conditions that produce spring flow, or the clay layer could impede the downward migration of any recharge and create a perched water table that also contributes to spring flow. **WATER SUPPLY Figure 17** illustrates the areal extent of the clay layer exposed in the vicinity of Stump Springs (Grover, 1919).

These local hydrogeologic conditions could influence the hydraulic connection between Stump Springs and the proposed project water supply wells, but data is lacking and the degree of connnectivity is poorly understood. As shown in **WATER SUPPLY Figure 7**, water levels around Manse and Bennetts springs have shown significant decline with historic groundwater pumping. This suggests there is a strong correlation between groundwater pumping and spring discharge at this location. Pumping conditions in the vicinity of the HHSEGS site may be different however, due to the potential presence of a fault barrier. The presence of one or more inferred faults between the project wells and Stump Springs could limit the hydraulic connection between project pumping wells and Stump Springs. BLM, other agencies, and the public have repeatedly commented throughout the project licensing review process that Stump Spring is a unique cultural and biological resource that must be protected. Staff therefore was conservative and utilized the range in aquifer parameters discussed above and assumed groundwater is hydraulically connected across the fault to consider the worst case scenario when estimating potential impacts to these sensitive biological receptors.

Drawdown Impacts to Receptors

The staff assessment employed well hydraulic equations and the principle of superposition to isolate estimated impacts due to project pumping. The principle of superposition states that linear systems can be added together to determine the conditions of the composite system (Reilly et al., 1987). The approach is particularly useful when determining pumping effects in an aquifer system with complex or unknown stresses because it isolates the pumping effect studied from other stresses to the groundwater system. In this application, the drawdown calculated by the well hydraulic equations is considered the impact due solely to the pumping well. Accordingly, this isolated drawdown distribution can be added to the existing pre-pumped water level surface to estimate the actual change in water level surface due to the new pumping.

Staff utilized the Theis equation (Theis, 1935) and the range in aquifer parameters reported in **WATER SUPPLY Table 4** to estimate a range in drawdown from pumping. The Theis equation assumes that the pumped aquifer is confined; there is no recharge; the water pumped comes from a single, infinite, and horizontal aquifer of uniform thickness; the aquifer is homogeneous and isotropic; all flow to the well is radial and horizontal; Darcy's law is valid; the pumping well and observation wells fully penetrate the aquifer; the pumping well effectively has an infinitesimal diameter; and, the well is 100 percent efficient (Fetter, 1994). The drawdown calculated with the Theis equation would be greater than observed if actual aquifer conditions are not confined, or if

recharge to the pumped aquifer occurs. Hence, the Theis equation produces conservative results when, for example, it is applied to partially or semi-confined aquifer conditions.

The following equations (Equation 1 and Equation 2) were used to apply the Theis solution and predict drawdown (s) at given distances.

$u = (r^2S)/4Tt$ (Equation 1)

$dh = (Q/4\pi T)\ W(u)$ (Equation 2)

Where,

r = radial distance from the pumping well (L)
S = aquifer storativity (dimensionless)
T = aquifer transmissivity (L^2/T)
t = time (T)
h = hydraulic head (L)
Q = pump rate (L^3/T)
W(u) = well function of u

In contrast to the approach employed by staff, the applicant's groundwater analysis considered three different equations to estimate aquifer parameters from the pumping test data and assess potential impacts from project pumping: Hantush, Hantush-Jacob, and Neuman-Witherspoon equations (CH2 2012l, CH2 2012dd). The three equations are all similar in that they represent leaky-aquifer conditions, which occur when water pumped from a well is supplied from water in storage and recharge from an adjoining aquifer and aquitard located either above or below the pumped aquifer. Many of the aquifer assumptions inherent to the Theis equation are similar to those for these leaky aquifer equations, except that the leaky aquifer equations allow for water to come from sources other than the main aquifer.

Staff agrees with the applicant that the water level response in some of the wells could possibly indicate local leaky aquifer conditions. However, the analysis of a leaky aquifer test requires drawdown data for the pumped aquifer, the adjoining aquifer that supplies the recharge (the leakage), and the leaky-bed (the aquitard) that separates the two aquifers (Kruseman et al., 1994). The well log data and water level changes monitored during the applicant's test are insufficient to identify the pumped aquifer, leaky aquifer, and intervening aquitard. For example, the monitoring wells are shallow relative to the substantially deeper depths from which the groundwater was pumped during the February 2012 aquifer test. Furthermore, the hydrogeologic information available is insufficient to confidently identify the adjoining aquifer that supplied the recharge during the test, what the water level changes were in the leaky aquifer as a result of the deeper pumping (if different from the water-bearing materials monitored by the shallower monitoring wells), the thickness and extent of the intervening aquitard, and the depth and thickness of the pumped aquifer. Staff therefore was conservative in its approach and employed the Theis equation for a confined aquifer for the impact analysis.

Stump Springs

Stump Springs is a BLM identified Area of Critical Environmental Concern (ACEC) and is surrounded by mesquite that may be dependent on groundwater for survival. The ACEC area supports a range of plant and animal species and is also a valuable cultural resource. See the **BIOLOGICAL** and **CULTURAL RESOURCES** sections of this FSA for more information about the Stump Springs area.

Staff employed the Theis equation to estimate the range of drawdown impacts. To represent the uncertainty in reported aquifer transmissivity and storativity, staff utilized the range of transmissivity and storativity values reported by the applicant in the AFC and the results of their aquifer tests (**WATER SUPPLY Table 4**). To account for uncertainty in aquifer conditions, the transmissivity and storativity values were chosen to show the range in potential drawdown impacts. This analysis assumes that the project pumps 4,900 AFY over a 33 year period consistent with the applicant's description.

WATER SUPPLY Figure 18 summarizes staff's estimate of the potential drawdown at the distance of the Stump Springs monitoring well and the latent effects on water levels after pumping ends. The range of drawdown estimated at the distance of the Stump Springs monitoring well is 0 (minimum transmissivity and maximum storativity) to 19 feet (minimum transmissivity and storativity); all other aquifer parameter combinations fall between these two limits. These results are considered maximum potential impacts because they ignore the Pahrump-Stewart Valley Fault Zone, which likely limits the hydraulic connection between project pumping and groundwater northeast of the fault zone associated with Stump Springs.

The applicant's AFC also employed the Theis equation to calculate the spatial distribution of drawdown impact from 25 years of pumping from two wells at a combined rate of 87 gpm. They utilized transmissivity values that ranged from 3,612 to 14,450 gpd/ft and a storativity value of 0.01,which are near the average values of the dataset reported in **Water Supply Table 4** (HHSG 2011a); staff's analysis employed the range of this same data set. The applicant has since changed their approach that includes the contribution of leakance and calculates a substantially smaller drawdown impact. However, there is no data regarding pumping impacts on the leaky aquifer which could be either above or below the pumping well. Consequently there is no reliable estimate of the pumping impact on the leaky aquifer.

Staff describes the maximum areal extent of the estimated pumping drawdown, ignoring the fault zone and assuming no hydraulic barrier exists between project wells and Stump Springs. In **WATER SUPPLY Figure 19**, staff shows the relatively worst-case scenario for drawdown at Stump Springs using transmissivity equal to 660 gpd/ft and storativity equal to 0.0014. **WATER SUPPLY Figure 20** shows a relatively best-case scenario for Stump Springs using transmissivity equal to 660 gpd/ft and storativity equal to 0.064. If the intervening Pahrump-Stewart Valley Fault zone acts a low permeability barrier then drawdown from project pumping would be limited on the opposite side of the fault zone where the mesquite and Stump Spring are located. The **Biological Resources** section of this **FSA** concludes that any measurable drawdown at Stump Springs or Mesquite Vegetation stands would be a significant impact. Accordingly, staff noted the wide range in estimated drawdown calculated by the variability in aquifer

parameter values. Given the significant variability and limited data available to characterize aquifer parameters, staff believes it is necessary to consider the uncertainty in aquifer conditions and evaluate the range in potential impacts that may occur at Stump Springs.

Stump Springs and the region sub-parallel to and adjacent to the Pahrump-Stewart Valley Fault Zone support approximately 1,915 acres of mesquite and associated habitat. Any incremental decline in water levels in this region could result in adverse impacts to groundwater dependent vegetation. Staff therefore proposes Condition of Certification **WATER SUPPLY-4**, which would require the applicant to monitor groundwater levels on and near the site and evaluate whether project pumping would result in measurable drawdown beneath offsite biological receptor areas. Using generally accepted methods, the monitoring data would be used to project potential drawdown beneath the biological receptor area locations. **WATER SUPPLY- 4** specifies a projected decline of 0.5 foot at the project boundary as a trigger for a potential impact. This trigger was chosen based on the close proximity of mesquite on the eastern project boundary and the ability to detect a statistically significant change in water levels that can be attributed to project pumping. Using 0.5 foot as a trigger staff anticipates this would correspond to some small decline in water level at the mesquite locations. This condition would support Condition of Certification **BIO-23** which would require the applicant to stop, modify, or reduce groundwater pumping until the applicant can show 1) the pumping can be reduced or modified to maintain groundwater levels above the 0.5 ft. drawdown threshold at the project boundary; 2) the drawdown trigger was exceeded due to factors other than the project pumping and the project did not contribute to the drawdown; or 3) through vegetation monitoring and soil coring described in this condition and predictive hydrologic trend analysis described in **WATER SUPPLY-4**, that a greater groundwater drawdown will not result in significant adverse impacts to the groundwater dependent vegetation.

Amargosa River

The Amargosa River is 185 miles long and begins in Nye County, Nevada and flows south through Tecopa, California before bending northwards and eventually terminating in Death Valley (**WATER SUPPLY Figure 1**). The Amargosa River is a federally designated Wild and Scenic river and is also designated as an Area of Critical Environmental Concern (ACEC). A portion of the river west of the site is shown on **WATER SUPPLY Figure 2.** The river is thought to get most of its water from base flow (groundwater rising to the surface) rather than from surface drainage (Stonestrom et al., 2007). Recent models of the Death Valley regional flow system suggest that the Amargosa River may receive its water from the regional groundwater (carbonate aquifer) system which spans multiple water sheds (Belcher et al., 2004). The degree of connectivity between the regional or carbonate aquifer system and intervening valley basin fill aquifers such as the PVGB is poorly understood.

The proposed project consumes groundwater and therefore reduces groundwater flow that would otherwise move down-gradient of the site. There is no available data that identifies groundwater flow paths or confirms a hydraulic connection between PVGB and the Amargosa River, so the water consumed by project pumping may or may not be a source of inflow to the Amargosa River. The inferred potentiometric surface (**WATER SUPPLY Figure 4**) indicates PVGB groundwater in the alluvial aquifer moves in a

southwesterly flow direction, but data is not sufficient to confirm that these flows discharge to the Amargosa River. It is more likely that the contributing flow, if any from this portion of the basin, occurs in the deeper regional aquifer system which is recharged up-gradient from the site. A letter submitted to the Energy Commission from the Amargosa Conservancy described a geochemical data analysis that concluded groundwater flow from the PVGB and through the Chicago Valley into the Amargosa River is limited (ARM 2011a).

Given the lack of evidence for a hydraulic connection, the relatively large intervening distance (about 20 miles), and uncertainty in potential flow barriers and permeability contrasts within the subsurface it would be speculative to conclude that project, pumping would adversely affect the Amargosa River. However, the principle of conservation of mass dictates that any groundwater consumed by the project is water that would otherwise accrue to down-gradient basins, which could possibly include discharge to the Amargosa River. Staff is not able to determine if there is a measurable change at the river because there is inadequate information available to quantify the hydraulic connection between the basin and river.

Staff understands that the BLM, as well as other agencies and interested parties considers any drawdown at the river a significant impact because of the river's Wild and Scenic designation. However, the potential for an impact relies on the river being hydraulically connected to the project pumping well and that aquifer water-transmitting and storage properties are constant and continuous down gradient of the project site. It ignores the potentially complex interaction between groundwater in the alluvium, groundwater in the deeper regional aquifer, and their combined influence on discharge to the river. Furthermore, project induced drawdown at the river is unlikely given the known heterogeneity in hydrogeologic conditions and potentially complex flow patterns between alluvial aquifers, the deeper carbonate aquifer, and the river and other discharge locations. Staff therefore concludes that a significant impact at the Amargosa River due to project pumping is unlikely. However, **WATER SUPPLY-1** which requires an offset of project water use in the PVGB would ensure there is likely no net overall change in subsurface outflow from the PVGB that might affect the Amargosa River.

Drawdown Impacts at Existing Wells (Well Interference)

All operating wells within a groundwater basin contribute to a lowering of water levels at other well locations. The overlap of drawdown among two or more wells is the "well interference," and is significant if it results in a loss of yield or exposes the well screen. The magnitude of drawdown impact is controlled by five factors: (1) the rate of pumping; (2) the duration of pumping; (3) the depth of the well screens (water-intake depth of well); (4) aquifer parameters (hydraulic conductivity and storativity, which are determined by the aquifer materials); and, (5) aquifer boundary conditions. A loss of yield is appreciable if the interference renders an existing nearby well incapable of meeting 1) maximum daily demand, 2) dry-season demand, or 3) annual demand.

Based on the estimates of the impact at Stump Springs, the neighboring well owners could experience water level declines between 1 and 50 feet after 33 years of project pumping (See **WATER SUPPLY Figure 19** and **20**).

Staff considered two additional impact scenarios that tested potential effects of the Pahrump-Stewart Valley Fault Zone acting as a barrier to groundwater flow. Because the proposed project is located near the fault zone, staff approximated its effect on drawdown beneath areas to the southwest by doubling the simulated pumping rate. This approach mimics the effect of all proposed project groundwater use extracted from approximately one-half of the aquifer located southwest of the fault. Staff considered the scenarios shown in **WATER SUPPLY Figure 19** and **WATER SUPPLY Figure 20** assuming the fault is an impermeable barrier (the maximum and minimum drawdowns, respectively). The estimated drawdown in the Charleston View Community for these conditions ranged from 77 to 13 feet, respectively.

Increased Cost of Pumping

If the total hydraulic head in neighboring domestic wells is lowered, then well yield would be reduced and an increase in pumping cost is expected. Pumping costs can be estimated with the following equation (3).

$C = 0.746Qhc / 3960e_pe_m$ (Equation 3)

Where

C = total cost per hour
Q = pump rate (gpm)
h = total head (ft)
c = cost per kWh
e_p= pump efficiency
e_m = motor efficiency

Staff estimated potential increases in pump cost incurred by an owner experiencing a 10-foot decline in water levels using a pump (e_p) and motor (e_m) efficiency of 80-percent (0.80) and a cost for energy equal to $0.16 per kWh. Using these values, pumping costs could increase by about 15 percent. Staff believes that the decrease in well yield that would result in a 15 percent increase in pumping costs is a significant impact. Staff proposes Condition of Certification **WATER SUPPLY-4** which would require the monitoring of local domestic wells to determine if project-induced water level decline is observed at the southern end of the project boundary. Staff also proposes Condition of Certification **WATER SUPPLY-5** which provides a method for calculating the reimbursement necessary to offset costs from decreased well yield. This condition utilizes an equation similar to Equation 3 above, but applied to a particular well under its own set of unique circumstances.

Physical Damage

Exposure of neighboring well screens represents the potential for physical damage to a well. A reasonable threshold of significance is if the project causes the static water level (the water level when the pump is off) at wells to fall below the top of their well screens. The shallowest well screen in the basin is not used to define the threshold because it constrains groundwater use by all other existing users. In contrast, the deepest well is also not used because many existing users can be significantly impacted before reaching the top of the deepest well screen. Additionally, in practice some wells may

have static water levels that are already below the top of the screen and a relatively small amount of additional drawdown would be of little consequence because the risk of screen collapse due to corrosion is already present. At other wells, pumping water levels (the water level when the pump is on) can be below the top of the screen. Corrosion is not usually a high risk in these situations, and a small increment of additional drawdown would presumably not substantially increase the likelihood for damage to occur. Accordingly, staff utilized the average top-of-screen depth as the threshold indicating potential physical damage to existing wells.

Staff analyzed the potential drawdown effects from project pumping on existing nearby wells. The California Department of Water Resources (DWR) maintains the record of well completion reports for the California portion of the basin only. A search of the records returned 12 wells within a 7-mile radius of the project site (**WATER SUPPLY Table 5**).

WATER SUPPLY Table 5
Wells of Record Southern Pahrump, California

Well Number	Depth to Bottom of well (ft)	Depth of Screened Interval (ft)
1	280	60-280
2	1,106	NA
3	220	160-220
4	200	160-200
5	1,351	NA
6	300	110-300
7	600	180-400, 420-600
8	310	90-110, 150-190, 230-250, 270-310
9	175	140-175
10	212	112-212
11	260	220-260
12	220	160-220

The median depth of the wells is 280 feet, and the median depth to the top of the screen is 150 feet below land surface. Current groundwater levels at the project site are about 130 feet below ground surface. Water level measurements at these wells are in close proximity to the Charleston View community. If water levels are roughly the same as at the site then predicted maximum drawdown of 50 to 77 feet could result in exposure of screens or other physical damage.

Staff proposes Condition of Certification **WATER SUPPLY-4** to monitor and mitigate potential physical damage to neighboring domestic wells beyond baseline conditions.

Subsidence

Ground subsidence can occur as a result of water level decline in aquifer systems. When the fluid pressure in an aquifer is reduced as a result of changes in the

groundwater level, a shift in the balance of support for the overlying materials causes the “skeleton” of the aquifer system to deform. Reversible deformation occurs in all aquifer systems as a result of the cyclical rise and fall of groundwater levels associated with short and longer term climatic cycles. Permanent ground subsidence can occur when pore water pressures in the aquifer fall below their lowest historical point, and the particles in the aquifer skeleton are permanently rearranged and compressed. Soils particularly susceptible to such consolidation and subsidence include compressible clays in a confined aquifer system. This type of deformation is most prevalent when confined alluvial aquifer systems are overdrafted. Subsidence due to overdraft like that occurring in the PVGB can occur and significantly impact the aquifer storage capacity. Differential settlement caused by subsidence can also change drainage patterns and cause ponding and flooding or change runoff directions. It can also damage structures and linear features such as roads and utilities.

The applicant stated in Data Response Set 1A, number 45, that subsidence is not an issue because the maximum projected drawdown at identified structures is about 9 feet. However, staff’s analysis showed that potential drawdown at local structures could be greater than 50 feet. Furthermore, dePolo et al (1999) have mapped fissures in the Pahrump Valley and concluded they are likely related to subsidence from groundwater withdrawals. Applicant aquifer test results confirm semi-confined to confined aquifer conditions and substantial thicknesses of clay beds occur beneath the site, which are both conducive to subsidence.

Given past and current groundwater pumping in the basin, subsidence could be occurring and project pumping could exacerbate subsidence rates and magnitude. It is unclear however, if subsidence is occurring on or near the site and whether any resources or structures could be affected by subsidence. Due to the uncertainty related to conditions at the project site, staff recommends that survey monuments be installed and monitoring stations established for assessment of long term changes that may occur as a result of subsidence due to groundwater pumping in the area. Staff also recommends the applicant be required to develop an action plan for mitigation of impacts based on analysis of monitoring station data. Staff recommends the project owner be required to implement **WATER SUPPLY-6** to monitor and mitigate any potential impacts associated with ground subsidence due to project groundwater pumping.

Water Quality

Water quality can be impacted by sustained pumping of the groundwater basin and migration of low quality or contaminated water towards pumping well screens. The Lahontan Regional Water Quality Control Board also protects local groundwater through the Water Quality Control Plan for the Lahontan Region, also known as the Basin Plan. The Plan establishes water quality objectives that apply to groundwater in the PVGB. Specific objectives include: coliform bacteria, chemical constituents, radioactivity, and taste and odor. Total dissolved solids concentrations (TDS) is an example of a water quality objective in the category “chemical constituent.” It is an indicator of the quality of groundwater and is a measure of acceptance for groundwater use as a drinking water source. In California, the recommended Secondary MCL or ‘Consumer Acceptance Contaminant Level’ for TDS is 500 mg/l, and upper and short term ranges can be 1,000

and 1,500 mg/l, respectively. Water with TDS concentrations greater than 3,000 mg/l is generally considered undrinkable. These water quality objectives are identified to protect the following beneficial uses identified for groundwater in the PVGB: Municipal and Domestic Supply, Agricultural Supply, and Fresh Water Replenishment. Staff reviewed available water quality data to evaluate whether the project's proposed pumping could result in water quality degradation. During the applicant's initial site investigation a water quality sample was taken from the Orchard Well which is located on the proposed site (**WATER SUPPLY Figure 4**). The constituents detected in the water sample are reported in **WATER SUPPLY Table 6** below.

WATER SUPPLY Table 6
Water Quality Constituents, Orchard Well

	Constituent	Units	Concentration
1	Alkalinity, Bicarbonate (CaCO3)	mg/L	134
2	Alkalinity, Carbonate (CaCO3)	mg/L	<20
3	Alkalinity (Total)	mg/L	134
4	Aluminum	mg/L	<0.100
5	Arsenic (Total)	ug/L	<0.030
6	Barium (Total)	ug/L	0.028
7	Beryllium	mg/L	<0.003
8	Bicarbonate	mg/L	134
9	Cadmium	mg/L	<0.003
10	Calcium	mg/L	53
11	Chloride	mg/L	7.4
12	Chromium (Total)	ug/L	<0.005
13	Conductivity	uS/cm	557
14	Copper	mg/L	<0.005
15	Flouride (Total)	mg/L	0.54
16	Hardness (CaCO3)	mg/L	246
17	Iron (Total)	ug/L	<0.10
18	Lead	mg/L	<0.015
19	Magnesium	mg/L	27
20	Manganese	mg/L	<0.005
21	Nitrate/Nitrite	mg/L	7.3
22	pH	log(L/mol)	8.0
23	Silica	mg/L	10
24	Silver	mg/L	<0.010
25	Sodium	mg/L	21
26	Sulfate	mg/L	110
27	Total Dissolved Solids (TDS)	mg/L	361
28	Total Organic Carbon (TOC)	mg/L	<1.0
29	Total Suspended Solids (TSS)	mg/L	<1.0
30	Zinc	mg/L	0.069

Staff notes that the site is partially underlain by playa deposits which can be associated with saline shallow groundwater. In some desert groundwater basins of the southwest an increase in salinity concentrations has been observed with an increase in basin fill

sediment depth. Because the proposed project could draw water from a large radial extent, and there is substantial uncertainty in the water quality distribution and drawdown effects on the quality of water produced by existing wells, staff proposes Condition of Certification **WATER SUPPLY-4** to ensure no impacts to the basin water quality objectives and existing wells. This condition requires that the project semi-annually monitor water quality in on-site extraction wells and project related monitoring wells. The monitoring results would be reported to staff and Inyo County.

Drinking Water

The proposed project would be supplied with potable water during operations from a newly constructed onsite groundwater well. Well water would need to be treated to meet the California Safe Drinking Water Act requirements, including those contained in Title 17 and Title 22 of the California Code of Regulations (CCR).

The HHSEGS is expected to employ 120 full-time employees and 50 to 60 shift workers during operations and many more during construction. Therefore the HHSEGS project would qualify as a Public Supply System by serving more than 25 people for more than 60 days. The facility would also qualify as a non-transient non-community water system, serving at least 25 persons for over 6 months per year.

Senate Bill 1307 passed in 1997 and enabled California to implement the provisions of the federal Safe Drinking Water Act. The California Department of Public Health administers the state's authority. The California Department of Public Health (CDPH) has authority to delegate regulatory authority over public water supplies serving 200 or fewer connections to a local health officer authorized by the board of supervisors. The CDPH delegated authority to the Inyo County Environmental Health Department to serve as the Local Primacy Agency (LPA), therefore the applicant would be required to meet the requirements of the Inyo County Environmental Health Department.

Staff recommends Condition of Certification **WATER SUPPLY-7**, which would require the applicant to obtain a permit to operate a non-transient, non-community water system with the Inyo County Environmental Health Department at least sixty (60) days prior to commencement of construction at the site. This condition would ensure that the applicant meets all provisions of Title 22, Section 3 to provide a suitable domestic water supply.

Staff also recommends Condition of Certification **WATER SUPPLY-3**, which would ensure that water supply wells are constructed or modified in accordance with Inyo County standards and registered with the California Department of Water Resources (DWR). The applicant would submit a well construction packet to the Inyo County Environmental Health Department for review and comment and to staff for review and approval. A Well Completion Report would also be submitted to DWR prior to approval.

Existing Wells

There are a number of wells that are currently present on the project site. These wells have been used for past activities at the site including domestic and agricultural use. Some of these wells were used for monitoring and measurement of aquifer parameters during the February and October 2012 aquifer performance tests. One of the wells

identified as the Orchard Well has an unidentified obstruction at the bottom and another known as Well No.3 currently has a submersible pump stuck at the bottom. During various site explorations other abandoned wells were also identified. The condition of some of these wells is not well known and it is unclear whether they may have been a conduit for contamination. Staff is concerned that these abandoned wells could become or are conduits for contamination of groundwater.

The California Well Standards provide minimum standards that well owners must follow to ensure protection of groundwater quality. The standards state that a well is considered “abandoned” when it has not been used for a period of one year unless the owner demonstrates his intention to use the well again for supplying water. The standards require that all "abandoned" wells and exploration or test holes be destroyed. The objective of destruction is to restore as nearly as possible those subsurface conditions which existed before the well was constructed taking into account also changes, if any, which have occurred since the time of construction. To ensure compliance with the California Well Standards staff recommends the applicant be required to comply with the California Wells Standards as specified in **WATER SUPPLY-3**. Compliance with these requirements would ensure that wells that would not be used for project purposes would be abandoned appropriately. It also provides a means for qualifying wells and maintaining them in a safe condition in the event they may be needed for future purposes. Staff acknowledges it may be beneficial to use some existing wells for monitoring purposes. In these cases the well condition would have to be evaluated and rehabilitated if necessary to ensure protection of water quality.

CUMULATIVE IMPACTS AND MITIGATION

Staff analyzed whether the project pumping along with all other reasonably foreseeable pumping in the Southern PVGB could have a significant impact. Staff found five projects that could require a substantial volume of water for annual operation. **WATER SUPPLY Figure 21** lists the reasonable foreseeable projects that may be developed in the southern PVGB.

WATER SUPPLY Figure 22 shows pumping impacts of two potentially contemporaneous groundwater users in the vicinity of the proposed HHSEGS project – the Hidden Hills Ranch and Sandy Valley projects. Staff’s cumulative analysis assumed that the HHSEGS project pumps 288 AFY for 2 years and 5 months of construction, followed by 30 years of operational pumping of 140 AFY. In addition, it assumed that the Hidden Hills Ranch pumps 211 AFY and that the Sandy Valley project pumps 170 AFY for 33 years. **WATER SUPPLY Figure 22** shows the maximum drawdown (transmissivity of 660 gpd/ft and a storativity of 0.0014) for the combined pumping from these projects.

WATER SUPPLY Figure 22 also shows that the potential cumulative water level decline at both Stump Spring and the private wells located in the Charleston View community could be greater than 60 feet. These results could be conservative with respect to the mesquite and Stump Spring. The results ignore the reportedly low permeability fault zone which could act as a partial barrier between the HHSEGS wells southwest of the fault and the Hidden Hills Ranch and Sandy Valley project wells

northeast of the fault. The fault zone would substantially limit the spread of drawdown from the Hidden Hills Ranch and Sandy Valley project wells to the area southwest of the fault which would limit the cumulative effects on the Charleston View community. Similarly, the spread of drawdown from the HHSEGS wells would be limited northeast of the fault. Staff proposes Conditions of Certification **WATER SUPPLY-4**, and **-5** to mitigate potential impacts from the HHSEGS project to neighboring wells and ensure that groundwater dependent species and habitats are adequately protected from the project's contribution to cumulative impacts.

A drawdown impact from cumulative pumping on the Amargosa River is specualtive. Staff is not able to determine if there is a measurable change at the river because there is inadequate information available to quantify the hydraulic connection between the basin and river. Given the lack of evidence for a hydraulic connection, the relatively large intervening distance (about 20 miles), uncertainty in potential flow barriers, permeability contrasts within the subsurface, and the presence of the fault zone which would isolate pumping effects from the Sandy Valley site, staff concludes that a significant cumulative impact at the Amargosa River due to project pumping is unlikely. However, **WATER SUPPLY-1** which requires an offset of project water use in the PVGB would ensure there is likely no net cumulative overall change in subsurface outflow from the PVGB that might affect the Amargosa River.

COMPLIANCE WITH LORS

The proposed HHSEGS project would comply with all LORS identified by staff if the proposed conditions of certification are implemented. Staff weighs a number of considerations while assessing how well a project's water use complies with LORS and California state policies regarding water use at industrial facilities. A summary of those considered by staff are include below.

SWRCB RESOLUTION 75-58, ENERGY COMMISSION'S 2003 INTEGRATED ENERGY POLICY REPORT, AND THE WARREN-ALQUIST ACT

The California Energy Commission, under legislative mandate specified in the *2003 Integrated Energy Policy Report (IEPR)*, would approve the use of fresh water for cooling purposes by power plants it licenses only where alternative water supply sources and alternative cooling technologies are shown to be environmentally undesirable or economically unsound. SWRCB Resolution 75-78 states that fresh inland waters should only be used for power plant cooling if other sources or other methods of cooling would be environmentally undesirable or economically unsound. . The Warren-Alquist Act promotes all feasible means of water conservation. Each of the proposed power plants include a steam turbine using an air-cooled condenser, which achieves maximum water conservation associated with cooling. Therefore, the proposed project complies with the requirements of SWRCB Resolution 75-78, the Energy Commission's 2003 Integrated Energy Policy Report (IEPR), and the Warren-Alquist Act.

PSA COMMENTS

Comment #	DATE	COMMENT TOPIC	RESPONSE
1	July 17, 2012	Inyo County	
1.4		Water Supply conditions of certification should include the same level of monitoring as outlined in the Air Quality, Biological Resources and Cultural Resources portions of the PSA.	Water supply conditions have been included that require an appropriate level of monitoring that would indicate drawdown impacts and require mitigation.
1.5		The proposed project with trigger reporting requirements mandated by SBX&-6.	Staff is aware of this reporting requirement and has written conditions that allow the county to remain in compliance.
1.67		Revise the first paragraph of WATER SUPPLY-6 to read: The project owner shall submit a Groundwater Level Monitoring, Mitigation, and Reporting Plan to the CPM and to the Inyo County Water Department review and approval.	Change accepted and incorporated in document. Specifically to the County for review and to the CPM for approval.
1.68		Revise WATER SUPPLY-6, A.1, add the following: shall identify the owner of each well, and shall include the location, depth, screened interval, pump depth, static water level, pumping water level, and capacity of each well, The plan should include, as feasible, agreements from the owner of each well approving monitoring activities.	Change accepted and incorporated in document.

1.69		1. add: and to the Inyo County Water Department 2. add: The plan shall include a model for predicting changes in the groundwater flow system resulting from the Project which has the capability to assess changes in hydraulic head, flow rate, flow direction, and water budget and shall include model runs which predict effects of the planned groundwater pumping by the Project on GDEs and predictions of the level of groundwater pumping that will cause significant impacts on such habitats and resources. The Project Owner shall also use the model to provide an evaluation of the sustainability of the water supply for the life of the project, including the cumulative sustainability when considered with other pumping occurring or projected to occur in the groundwater basin. 3. delete: This condition proposes a threshold for significant impacts to groundwater-dependent vegetation caused by water level decline due to Project groundwater pumping. This condition also proposes mitigation that would, if initiated, reduce the impact to a level that is less than significant. 4. add: The plan shall also include: i. Provisions for initiation of water level monitoring as soon as wells are available and results will be publicly available: ii. A plan for logging and aquifer testing of all new production wells; iii. A plan for verifying the predictive tools described above and for revising or recalibrating the tools as necessary. iv. A plan for revising thresholds as dictated by new data concerning system response to Project operation, v. In cooperation with U.S. BLM and if permission is granted by BLM. the applicant shall fund and construct a monitoring well approximately 0.5 mile west of the Stump Spring ACEC for inclusion in the monitoring well network. vi. An enforceable commitment based on monitoring data and significance thresholds, to implement mitigation measures as necessary.	1. add: Change accepted and incorporated in document. 2. add: Additional modeling is not necessary to make this condition enforceable. 3. delete: Staff retains this part of the condition, which is necessary to mitigate any drawdown impacts to vegetation. 4. add: i. Commission staff will make this data available to the public. ii. Staff has required well logging in accordance with DWR requirements and developed a monitoring and mitigation framework that will allow for aquifer analysis during construction and operation pumping. iii. A procedure for recalibration of the drawdown threshold is now written into this condition. iv. same as iii. v. Staff believes the monitoring well arrays proposed in WATER SUPPLY-4 will be sufficient for evaluating potential impacts in mesquite areas that are closer than Stump Spring and would therefore be an earlier indicator of a potential impact. In addition to this array staff has also proposed a new monitoring well just west of Stump Spring that can be used to evaluate whether there is a barrier such as fault which is affecting drawdown from project pumping. vi. The condition would be enforceable as it is written.

1.70		Revise WATER SUPPLY-6,C.4 and WATER SUPPLY 8,C.5, add: Groundwater elevations shall be measured throughout the life of the project at least twice per year, and reported to the CPM and to the Inyo County Water Department. The County will report these data to the California Department of Water Resources as part of the California Groundwater Elevation Monitoring Program.	Change accepted and incorporated in document.
1.71		Revise the Verification section of WATER SUPPLY-8 in each instance where a report or information is to be submitted to the CPM to read: ". to the CPM and to the Inyo County Water Department.	Change accepted and incorporated in document.
1.83		Preliminary assessment of the project indicates that the project could exacerbate overdraft conditions, contribute to water level decline for groundwater dependent vegetation, and substantially lower water levels in neighboring domestic wells. Compliance could be met based on the addition of the County's Conditions of Certification.	Comment noted. Many proposed conditions have been accepted, as indicated in the above responses.
1.84		Pump tests performed for the project were subject to irregularities in execution, and were discontinued prematurely, and the results were inconclusive. Despite these issues, preliminary assessment of the project indicates that the project could exacerbate overdraft conditions, contribute to water level decline for groundwater dependent vegetation, and substantially lower water levels in neighboring domestic wells. Compliance could be met based on the addition of the County's Conditions of Certification.	Comment noted. See responses above.

1.11		To fulfill the requirements of the legislation, DWR initiated the California Statewide Groundwater Elevation Monitoring Program (CASGEM). Participation in CASGEM by local entities is voluntary; however, if no eligible local party volunteers to become the designated monitoring entity, DWR may undertake the groundwater elevation monitoring. If DWR assumes responsibility for the groundwater monitoring, nonparticipating eligible monitoring entities may lose eligibility for water grants and loans awarded or administered by the state. Naturally, Inyo County is concerned about the potential for losing eligibility for these grant funds, and wishes to comply with the requirements of CASGEM. No funding was provided in the legislation for local entities to implement this new state prograrn.	The revised conditions would ensure that the project owner shares their groundwater elevation data with the county.
1.12		Approval of HHSEGS will invalidate any argument by Inyo County that the California portion of Pahrump Valley, California Valley, and Middle Amargosa Valley are unaffected by land use activities; therefore, the County will be required to either develop a program for reporting groundwater elevations to DWR, or be ineligible for state water grants and loans. In order to comply with CASGEM requirements, the County could use the groundwater elevation monitoring data proposed in condition of certification Water Supply - 6 and Water Supply - 8 if those data are made available to the County.	The revised conditions would ensure that the project owner shares their groundwater elevation data with the county.

Comment #	DATE	COMMENT TOPIC	RESPONSE
2	July 16, 2012	Bureau of Land Management	
2.5		The applicant has performed an on-site well pump test, which lasted 4.5 days. We fully support the PSA's pump test review (Appendix A), which questions the assumptions, procedures, and conclusions of the applicant's pump test report. We recommend that another pump test be performed, lasting at least one week. This new pump test, combined with curve fitting for determination of the rate of drawdown stabilization at the monitoring wells, would better determine whether there is a direct link between the alluvial aquifer and the underlying carbonate aquifer. This information would help estimate the degree to which pumping may affect water resources to the east and west of the project, as well as the timing of such impacts. To get the best estimation of key subsurface parameters and impacts, it would be important for at least two of the monitoring wells to penetrate the carbonate aquifer. As shown in Figure 4 of Section 4.15 in the PSA, there are locations close to the project area where the carbonate aquifer is at or near ground surface.	Figure 4 is a very small scale cross section. This figure was not intended to show the depth of the carbonate aquifer at the project site but rather a generalized characterization of the PVGB. The applicant has completed a second aquifer test (October 2012) submitted as Data Response 2A-4. None of the monitoring wells penetrated the carbonate aquifer. Staff believes the depth to the carbonate aquifer (> 1,000 feet bgs) at the site is likely much greater than the target depth for project pumping (300 to 350 bgs). It is unknown where the carbonate aquifer would be encountered in the vicinity of the site. Staff believes the monitoring network proposed in WATER SUPPLY-4 is appropriate for monitoring potential impacts given the current knowledge of the groundwater system in the PVGB.

2.6		The lack of any physical logs for any onsite or nearby wells impedes the ability to draw clear conclusions as to aquifer parameters and the impact of pumping on the aquifer. If well logs are available, the applicant should utilize them to validate its conclusions regarding the impact of pumping on groundwater. At least some of the monitoring wells should be screened in the same stratigraphic interval as the pumping well. Actual physical data from well logs rather than assumed values for aquifer parameters is critical for analyzing pump test results, and for using these results to construct a conceptual model of local and regional groundwater flow and the impacts of the HHSEGS project on this flow. If any of the above data reveal that the initial pump test conclusions were incorrect, the water supply and mitigation plans may need to be revised.	The applicant did not clearly define their conceptual model of the aquifer and did not validate their conclusions about impacts with any conceptual model of the area. Staff therefore employed a range in aquifer parameter values to consider uncertainty in projected impacts and considered these results in developing the proposed conditions of certification and appropriate mitigation.
2.7		The BLM supports implementation of condition of certification WATER SUPPLY-1, which would require the applicant to replace all extracted groundwater. This is similar to a mitigation measure being developed by California BLM in discussion with the developer of the Desert Harvest solar project in the Chuckwalla Valley, as well as future developers in that basin. Unlike the Desert Harvest mitigation, however, the PSA recommendation is to require BrightSource to simply replace the extracted water at some point during the 3D-year life of the project. At least some of this replacement should be required to occur early in the life of the project. Reinforcing this need is the existence of large ground cracks approximately 4 miles north of the HHSEGS site, which appear to be subsidence cracks caused by groundwater extraction in the area (see attached Figure 2); these features suggest that the basin is already experiencing an irreparable loss of storativity by diminishing local groundwater aquifers.	WATER SUPPLY-1 was revised to address this comment.

2.8		Specifically, the BLM suggests two additional wells directly up-gradient from Power Block 1 and two additional wells directly up-gradient from Power Block 2 to supplement CEC-identified BLM Mesquite Bosque Wells 1 and 2, respectively. These wells should be placed at regular intervals 0.5 to 1.5 miles from the project boundary. One additional well should be installed east of the Stump Springs ACEC so as to help differentiate any drawdown east of the ACEC, for example drawdown extending from the proposed BrightSource Sandy Valley SEGS project, from drawdown emanating from the HHSEGS site. If any drawdown is measured over time at the Mesquite Bosque Wells, monitoring wells placed in the configuration described above should provide adequate information to determine whether this drawdown is originating from the project site or is due to other factors identified above.	Wells in Nevada up-gradient of the site appear to have much less consistent water level trends. For this reason staff modified WATER SUPPLY-8 (now WATER SUPPLY-4) to rely solely on the onsite wells to project water level declines up-gradient to the site. This is a conservative and defensible approach to project off-site drawdown and identify if thresholds have been reached.
2.9		Condition of certification WATER-SUPPLY-8 recommends only one well to the west of the project, between 2 and 3 miles from the project boundary; this well would be on the far side of an inferred fault (Figure 13 of the PSA), which may delay drawdown at that well. The BLM recommends four additional wells; like the wells recommended above, these would be placed at regular intervals up to two miles west of the project boundary.	The Condition (now WATER SUPPLY-4) now requires one well (Offsite California Monitoring Well between 0.5 and 1.0 miles from the southwest corner of the site, located between a bearing of southwest (225°) and west (270°). An alternative location can be approved by the CPM. Staff does not believe the four additional monitoring wells proposed by BLM are necessary. The analysis provided by staff shows that potential impacts to the Amargosa River are unlikely. Additionally, WATER SUPPLY-1 would require an offset of project water use in the PVGB and ensures there is likely no net overall change in subsurface outflow that might affect down gradient discharge features. Therefore, additional monitoring wells were not considered necessary by staff.

2.10		First, we recommend that drawdown triggers also be determined for other wells closer to the project, the locations of which are discussed above. These trigger depths would be graduated based on the expected drawdown at these wells that would correlate to an 0.5-foot drawdown at the Mesquite Bosque Wells, based on results of the additional pump test and curve fitting procedure discussed above.	Staff modified the condition to address this issue.
2.11		Second, we recommend that pumping be immediately curtailed or ceased if any of these drawdown triggers are crossed, regardless of whether impacts appear in the vegetation. By the time vegetation is noticeably affected, it may be too late for pumping curtailment to save these bosques.	Staff modified the condition to address this issue, such that it dovetails with condition BIO-23 to protect vegetation.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
4	**July 21, 2012**	**The Nature Conservancy**	
4.1		The Nature Conservancy believes there is justification for considering water use by this facility as essentially permanent; as a result, we recommend analyzing the effects of project pumping over a much longer period.	The AFC states the HHSEGS project would be designed for an operating life of 33 years. In addition, staff also proposes in WATER SUPPLY -1 that the applicant be required to offset project water use for the life of project operation regardless of the 33 year impacts analysis. Staff believes this term of analysis is adequate for CEQA and the stated purpose of the project.
4.2		This analysis of longer-term impacts is critical and justified because adverse effects from groundwater withdrawal can take a very long time to propagate through to distant springs and water dependent resources, even following the cessation of pumping. By the time effects are noticed through monitoring, it is often far too late to restore the health of these resources.	The revised staff analysis considered delayed drawdown by calculating impacts almost 50 years past the planned end of the project and estimate the maximum drawdown impact.

4.3		We believe that the intended design of the network should be extended to areas or resources that may be influenced by project pumping well beyond the project period and for a minimum of 100 years, given that operations at the HHSEGS facilities are almost certain to continue well beyond the first licensing period. It is simply unrealistic to expect that renewal of the plant's operating franchise would be withdrawn three decades hence, even if severe groundwater problems were encountered.	The revised staff analysis considered delayed drawdown by calculating impacts almost 50 years past the planned end of the project and estimate the maximum drawdown impact. See answer to 4.1, above.
4.4		However, we recommend that additional wells be required, that well locations be more clearly specified in the final staff assessment, that all drilling logs and other data on well construction, testing, and performance be made public.	The eleven proposed monitoring wells would adequately characterize and protect against impacts from the project. Staff has further specified the location of the well west of the project to address this comment. Drilling logs would be available along with testing data as part of compliance submittals.
4.5		We also recommend that applicant conduct at least one additional reasonable length pump test to supplement the results of the initial truncated test, using newly drilled production and monitoring wells.	The applicant conducted another pump test. New data provided by the pump test did not change staff's characterization of impacts.
4.6		Conducting at least one well-designed aquifer performance test after installation of one or more planned production wells and several associated monitoring wells-prior to the commencement of construction and permanent installation of the rest of the wells--would provide the applicant and the CEC with valuable data about how to site other wells and whether the initial assumptions about the aquifer configuration and the absence of off-site drawdown were correct.	See answer to Question 1.69.

4.7		Further, The Nature Conservancy recommends that the CEC require a total of three offsite monitoring wells (i.e. adding 2 wells) to the southwest of the HHSEGS site to detect possible effects on the Amargosa River and its protected resources.	See answer to 2.9, above.
4.8		Additionally, because of the intense public interest in groundwater issues, WS-9 should provide that all of the monitoring wells should include continuous data logging and recording devices and that the raw data and all reports be promptly placed on a public CEC website.	Staff would review and approve a monitoring plan in accordance with WATER SUPPLY-4, which would include specifications for appropriate data logging devices in each well. Data and reports submitted in accordance with WATER SUPPLY-4 would be public information and would be made available upon request.
4.9		We recommend that WS-1 be interpreted to require actual, steady, contemporaneous reductions in PVGB pumping equivalent to the pumping by HHSEGS, we also strongly recommend replacement of groundwater use at a ratio of greater than 1:1	WATER SUPPLY-1 was revised to more explicitly require actual contemporaneous reductions in water use. Offsets pursuant to CEQA must be proportionate to the project's impact. Here, if the offset is real and verified, the offset will be proportionate to the impact.
4.10		We also encourage the CEC to provide more clarity around how the PSA compensatory mitigation obligation would work in practice. The PSA appears to allow the applicant to acquire either an annual 167 acre feet/year or a gross quantity of water rights (4,900 acre feet) with no specified time period for the acquisition.	WATER SUPPLY-1 was revised to require mitigation for the life of the project.
4.11		Moreover, the mitigation obligation is framed as "one or more activities," which would apparently not compel the applicant to actually acquire and retire active, senior water rights in the PVG Basin.	The condition requires commission staff approve a water offset plan, but the offset can be achieved by means other than retirement of water rights, such as verified execution of water conservation measures.

4.12		However, we object to the specific trigger conditions proposed in PSA's biological resources (BIO-23 and 24) and water supply (WS-8) sections as Conditions for Certification, because these Conditions will not adequately protect groundwater dependent ecological resources before they are likely to experience significant harm.	Staff revised these conditions to require the applicant to modify or stop pumping until they can prove their pumping doesn't have an adverse impact to the water-dependent vegetation starting near the state line.
4.13		We recommend that the CEC establish clearer and more effective trigger conditions. Given that we lack understanding of the local and regional hydrology and an accompanying detailed groundwater flow model that could be used to predict and avoid adverse impacts, the only reasonable alternative is to set very conservative trigger conditions. We recommend that Applicant cease groundwater pumping when specified, measurable water level declines are detected in offsite groundwater	Staff revised these conditions to require the applicant to modify or stop pumping until they can show their pumping doesn't have an adverse impact on the water-dependent vegetation adjacent to and east of the site boundary.
4.13a		We thus advocate permit conditions requiring, once offsite water levels decline or any decline in vegetation health is detected, that the applicant demonstrate that those effects are not the result of their pumping.	See answer to 4.13, above.
4.14		We recommend that at least three monitoring wells be required between the project site and the Nopah Range, adequate to determine both water levels in, and effects of pumping on, the alluvial aquifer, as well as whether the alluvial aquifer and deeper carbonate aquifer are in communication. We also recommend that CEC specify mitigation requirements, including pumping cessation or reduction in the event that specified water level declines (greater than one foot) are noted in any of the monitoring wells or other adverse effects are detected.	Staff believes the location of one well in this area is adequate for measuring baseline and background conditions for the monitoring program outlined in WATER SUPPLY-4. Mitigation would be required if water level declines are detected in monitoring wells located much closer to the project pumping wells than the proposed well between the project and Nopah Range and are therefore likely more sensitive to project groundwater use. Additionally, WATER SUPPLY-1 would require an offset of project water use in the PVGB and ensures there is likely no net overall change in subsurface outflow that might affect down gradient discharge features.

4.15		The CEC should ensure that the river, its spring tributaries, and ecological resources are adequately protected by conservative conditions on project groundwater use to avoid adverse effects before they occur. This will require a well- designed monitoring network, development and use of a predictive groundwater model, and adaptive trigger conditions.	Condition WATER SUPPLY-1 requires that 100% of project pumping is offset; therefore basin outflow would likely not change.
4.16		In general, there is a scarcity of data related to the hydrology of the southern Pahrump Valley, California Valley, Chicago Valley and the Amargosa River. Also poorly understood are the groundwater interconnections between these aforementioned areas. Data supplied by the applicant has not increased the base of knowledge.	This uncertainty is acknowledged and discussed in the FSA. Staff's analysis notes the uncertainty in the hydraulic connections and fate of subsurface outflow from the PVGB. Condition WATER SUPPLY-1 would require that 100% of project pumping be offset and therefore basin outflow would likely not change.
4.19		Assuming a travel distance of 20 miles, a hydraulic conductivity (K) value of 1 foot per day (ft/d), a porosity of 0.2 and a gradient based on the difference in groundwater elevation between the site and the river, the calculated groundwater travel time was over 3,000 years. Increasing K to 15 ft/d reduced the travel time to 214 years. These calculations do not reflect the potential for the actual groundwater flow path between the HHSEGS site and the Amargosa River (assuming it exists) to significantly reduce those travel times.	This assumed flow path and travel time relies on the river being hydraulically connected to the project pumping well, which cannot be verified. There are also potentially complex interactions between groundwater in the alluvial-aquifer from which the proposed wells would extract groundwater and the deeper regional aquifer. These hydraulic interactions can result in complex flow patterns between aquifers, the river and other discharge locations. Furthermore, the intervening distance between pumping wells and river is substantial (about 20 miles), and there is uncertainty regarding potential subsurface flow barriers and permeability contrasts that would significantly limit hydraulic communication with the river. We therefore removed the travel time analysis.
4.20		More critically, the travel time for a particle of water to reach the Amargosa River from Pahrump Valley has little relationship to hydraulic effects, which can be transmitted nearly instantaneously over long distances within a confined aquifer. The result is that an estimate of travel time from Pahrump Valley is not a conservative assessment of potential effects to the Amargosa River.	See answer to 4.19 above.

Comment #	DATE	COMMENT TOPIC	RESPONSE
2	July 16, 2012	Bureau of Land Management	
5.1		Although the PSA water supply analysis acknowledges that HHSEGS pumping might affect the Amargosa, it discounts that effect based on calculations of the length of time that the pumping effects might take to affect the river— using the same inadequate body of data discussed above. The attached analysis commissioned by the Nature Conservancy by Johnson Wright, Inc., hydrogeological consultants, posits other likely routes by which the HHSEGS pumping might well affect the river much more quickly and directly than the PSA analysis estimates. We believe that it is incumbent on the Applicant and the CEC to rule out these effects and to require mitigation (e.g., pumping cessation) if effects are predicted by water level declines in appropriately sited monitoring wells.	This assumed flow path and travel time relies on the river being hydraulically connected to the project pumping well, which cannot be verified. There are also potentially complex interactions between groundwater in the alluvial-aquifer from which the proposed wells would extract groundwater and the deeper regional aquifer. These hydraulic interactions can result in complex flow patterns between aquifers, the river and other discharge locations. Furthermore, the intervening distance between pumping wells and river is substantial (about 20 miles), and there is uncertainty regarding potential subsurface flow barriers and permeability contrasts that would significantly limit hydraulic communication with the river. We therefore removed the travel time analysis. WATER SUPPLY-1 requires an offset of project water use in the PVGB and ensures there is likely no net overall change in subsurface outflow from the PVGB that might affect down gradient discharge features.

5.2		The PSA proposes that Applicant install a single monitoring well between the project and California Valley, but would propose no mitigation conditions in the event that water level declines are detected. This is clearly inadequate. We suggest that at least three monitoring wells be located west of the project site, completed in the alluvial aquifer in the producing horizon from which the project will be pumping water. Moreover, to establish whether the HHSEGS pumping will affect the carbonate aquifer, at least one well should have a dual completion in the alluvial and carbonate aquifers. (We note that the BLM's recent comments on the PSA support installing monitoring wells penetrating the carbonate aquifer.) If future water level declines in these wells predict effects on the Wild and Scenic Amargosa River, pumping should cease or be curtailed; however, the Applicant should first be given a reasonable opportunity to demonstrate that the water level changes are not due to its operations.	Staff believes the location of one well in this area would be adequate for measuring baseline and background conditions for the monitoring program outlined in WATER SUPPLY-4. Mitigation would be required if water level declines are detected in monitoring wells located much closer to the project pumping wells than the proposed well between the project and California Valley and are therefore likely more sensitive to project groundwater use. Additionally, WATER SUPPLY-1 requires an offset of project water use in the PVGB and ensures there is likely no net overall change in subsurface outflow that might affect down gradient discharge features.

5.2a		With regard to the groundwater dependent resources, in an attempt to protect groundwater dependent resources, the PSA water supply and biological resources conditions would require mitigation in the form of a temporary pumping cessation; however, before groundwater pumping is modified or discontinued over the long-term, the PSA requires the CEC to meet the burden of satisfying three difficult conditions: a water level decline of .5 foot, that the health of water dependent vegetation had declined by 20%, and that these effects were not due to actions or conditions beyond the control of the Applicant. This is nearly an impossible burden, and enforcement would be extraordinarily expensive, difficult, and protracted even in the face of clear adverse changes. Moreover, by first requiring a demonstrable decline in the health of vegetation, remediation would very likely be too late to avert permanent harm to the target resources. The Conservancy believes that declines in the water level in off-site monitoring wells sited to detect impending effects on key resources alone is a sufficient trigger for mitigation requirements, both for the groundwater dependent resources and the Amargosa River. In addition, vegetation effects should be included as a triggering condition as an independent basis for pumping reduction.	Staff significantly revised the water level monitoring approach and use of the trigger in WATER SUPPLY-4, which would require the applicant to modify or stop pumping until they can show their pumping doesn't have an adverse impact to the water-dependent vegetation east of the project boundary. See also the Biological Resources section and BIO-23 and -24 for further discussion of impact monitoring and mitigation.
5.3		In our view if a clear and easily enforceable groundwater level trigger is reached, the Applicant should have the burden of proof to establish that their operations are not the cause of the decline and, if the Applicant cannot meet this burden within a reasonable period time, groundwater pumping should cease.	Staff significantly revised the water level monitoring approach and use of the trigger in WATER SUPPLY-4, which would require the applicant to modify or stop pumping until they can show their pumping doesn't have an adverse impact to the water-dependent vegetation east of the project boundary. See also the Biological Resources section and BIO-23 and -24 for further discussion of impact monitoring and mitigation.

5.4		Both the PSA and the Applicant propose compensatory mitigation for groundwater pumping by employing some (largely undefined) method to offset project water use on a 1:1 ratio. The Amargosa Conservancy supports such compensatory mitigation, but believes that the nature of the obligation as proposed in the PSA and by the Applicant poses significant issues and requires clarification and improvement. The offset obligation, if framed to require reduction of Pahrump Valley basin water use, should be limited to permanent retirement of active senior water rights with a long and documented history of steady use, located closest to the project site, approved by Nye County and the Nevada State Engineer—and in multiples of the proposed project use. Multiple retirements are necessary for compensation because of the fact that the Pahrump basin is grossly over allocated, so retirement of even senior active rights may well have no positive effect on reducing basin water use, even in the short run. Also, because offsetting rights may likely be available only in the distant northern section of the Pahrump Basin in Nevada, effective mitigation for impacts of project water use on nearby resources also justifies a higher ratio. Accordingly, we suggest at least a 4:1 permanent retirement ratio.	WATER SUPPLY-1 was revised to more explicitly require actual contemporaneous reductions in water use. The goal of the offset requirement is that Pahrump Valley underflow discharge remain the same. CEQA provides for mitigation that is proportionate to the impact of a project. Thus, this project cannot be used to mitigate overdraft conditions caused by other users.
5.7		We believe that the CEC is required to take a much more serious look at the potential, long term effects of all of the existing and allocated water rights in the Pahrump Valley basin and of the potential cumulative impacts of groundwater pumping by the project in combination with groundwater pumping by other reasonably foreseeable projects on the Amargosa River and on other groundwater dependent resources. While the PSA has included a short list of current and future projects, the list is not complete, and does not include other forms of water pumping and use (e.g., agricultural pumping).	Staff has considered the over allocation of water rights in Nevada and understands that if all existing rights were utilized there would likely be significantly greater overdraft impacts in the PVGB than currently exist. Staff or the State of California do not control the administration of water rights in Nevada or project development that may occur in Nevada. Under CEQA, it is not reasonable to require an offset greater than 1:1 where true water use can be replaced and full mitigation is achieved for the proposed project. Staff has updated the list of reasonably foreseeable projects that could pump a significant volume of groundwater and considered this in the analysis.

Comment #	DATE	COMMENT TOPIC	RESPONSE
6	July 23, 2012	**Basin and Range Watch**	
6.38		The Energy Commission hydrologist said the applicant needed to reach out much farther in their analysis, and we agree. A gradient in a confined system is not a source of recharge. CEC wanted the applicant to have 3 monitoring wells outside the project in a line with the proposed project wells, all at 1,000 feet deep, and we recommend this as well. Two upstream from the project and one downstream. Triggers should be required as new mitigation, such as sending out biologists to monitor how the deep-rooted mesquite at Stump Springs react, and if they appear to be adversely affected. CEC said if they see a half foot drop in water at the project boundary, then the assumption could be made that pumping might be affecting Stump Springs.	Staff agrees with much of this comment, including triggers based on water drawdown and vegetation monitoring. In WATER SUPPLY-4 staff has revised the required depths for monitoring wells to be equivalent to the depths of production wells.
6.39		We agree with the CEC that groundwater pumping by the project would need mitigation. Mitigation Measures Water Supply 1, 6, 7, and 8 to offset impacts to overdraft in the basin and potential impacts to local well owners and nearby springs are needed.	Comment noted. The FSA addresses these issues.
6.40		We also recommend, in contrast with CEC, that there might be potential impacts to the Amargosa River drainage from unstudied connections with the Pahrump Valley aquifer; mitigation measures should be enacted.	See answer to 5.2 above.
6.41		A Water Supply Plan showing how the applicant will replace 163 AFY per year as a condition of certification in Water Supply-1 should be completed before approval and certification of the project so that the public can review this important plan. How do we know there are even enough private wells and water rights to purchase and retire?	A water rights purchase is one way to mitigate the proposed water use in the PVGB, but there are likely other approaches as well. The details of the offset plan would be provided after certification but prior to construction. Construction would not proceed until a viable offset plan is approved.

6.42		Similarly, a Groundwater Level Monitoring, Mitigation, and Reporting Plan (Water Supply-6) should be prepared now, before certification, so that the public -- and especially local residents -- can review the plan. There is a lot of deferred mitigation in this review. If project pumping lowers residents' well levels by 1.5 feet then the applicant should reimburse the well owners. We believe ten feet lowering is too much and damage may already be done to resident's ability to have a reliable water supply.	Staff has identified an adequate number of wells, locations, and depths to implement the monitoring and mitigation required in WATER SUPPLY-4 and -5. Staff requires complete details of the monitoring plan prior to project construction. In the FSA staff used 10 feet of drawdown and estimated there could be a 15 percent increase in pumping costs, which would be significant.
6.43		They want more monitoring wells farther out, towards California where unknown and potential connections with Amargosa Valley could be present. We support this recommendation, as more needs to be studied about the complex hydrology of the region before more drawdown is allowed. A regional groundwater map should be made, and more well testing should be undertaken before approval of this project.	See answer to 5.2, above.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
7	**July 23, 2012**	**Pahrump Paiute Tribe**	
7.8		Another effect to development is water usage, as illustrated by the lack of springs that once existed in the Pahrump Valley.	Spring flow in the valley seemed to decrease with increased development in Pahrump throughout the 1900s. This is discussed in both the PSA and FSA.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
8	**July 23, 2012**	**Richard Arnold, Pahrump Paiute Tribe**	
8.6		Any impacts to the hydrology and other important resources associated with the HHSEGS will elevate the risks of us maintaining cultural and ecological balance within and adjacent to the proposed Project Area and most importantly, to our cultural landscape.	The proposed mitigation in both the Water Supply and Soil and Surface Water sections would reduce the impacts to local hydrology to a level that is less than significant.

Comment #	DATE	COMMENT TOPIC	RESPONSE
9	**July 21, 2012**	**Big Pine Tribe of Owens Valley**	
9.2		The project will use approximately 140 acre feet of water a year. The Pahrump Valley groundwater basin has been in a state of overdraft for decades. The additional amount of water depletion for this project could have severe impacts on fragile desert vegetation such as the nearby mesquite bosques and other sensitive plant associations. Some last surviving cottonwoods and willows at Stump Springs not mentioned in the report may also be severely threatened with even minimal impacts to groundwater depletion.	The proposed mitigation measures in both the Water Supply and Biological Resources sections would be protective of the local groundwater-dependent vegetation and the local water supply. Proposed conditions would require the applicant to cease or reduce project pumping until they could prove that their pumping is not having an adverse impact. WATER SUPPLY-1 would require that the applicant offset all of their groundwater pumping within the Pahrump Valley.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
10	**July 21, 2012**	**Intervenor Cindy MacDonald -- Water Supply, pg. 19-1**	
AIR RESOURCES 10.61		If the applicant uses water trucks to control fugitive and windblown dust over the life of the project, what are the additional water annual water requirements and can they be met with the currently proposed water limitations?	The applicant has taken this water usage into account, staff agrees with their water use for mirror washing. Staff estimates 27 acre feet per year per power block for mirror washing. The total expected use of 140 AFY would leave 26 AFY for drinking (< 5 AFY) and dust suppression. So about 20 AFY left for dust suppression.
10.1		Given the critical nature of water resource availability in the Pahrump Valley Ground Basin, why does the CEC Staff believe it is appropriate to develop plans to resolve these issues outside the CEQA equivalency process and public review?	The Energy Commission is not exempt from CEQA. The amount of mitigation is already described. The details of how the applicant will meet the performance standard set in the conditions can be determined post licensing, so long as the basic requirement is satisfied.
10.2		Under what authority is the CEC Staff exempt from reasonably developing the Water Use Off Set Plan mitigation measure during this CEQA equivalency process, which should include analyzing levels of significance, compliance with LORS and effectiveness of mitigation measures to reduce impacts?	See answer to 10.1, above.

10.3		What is the projected zone of impact this Water Use Off Set Plan will be developed for?	The offset would have to occur in the Pahrump Valley groundwater basin. Therefore, the mitigation would address the impact within the Pahrump Valley groundwater basin.
10.4		What are some reasonably available measures or activities the applicant might employ in this Water Use Off Set Plan that would “replace” 4,900 acre-feet or 163 AFY over the life of the project?	The applicant could for instance buy out an existing agricultural operation in Pahrump with a historic record of pumping.
10.5		Does the 4,900 acre-feet or 163 AFY apply per year of operation or will it just be required as a one-time replacement value sometime during the 30-year life of the project?	See answer to 4.10, above.
10.6		Does the 4,900 acre-feet or 163 AFY only apply to the operational portion of the proposed project or does it apply to the construction portion of the project as well?	See answer to 4.10, above..
10.7		Why did Staff stipulate “replacing water” versus “retiring water” rights and what is the difference?	Staff did not use one phase over the other for any particular reason.
10.8		If the applicant is required to increase their right to an additional 4,900 acre-feet or 163 AFY of water without retiring it, would this mean the applicant will be authorized to use approximately 303 AFY if the proposed project is approved?	WATER SUPPLY-1 sets the construction limit to 288 acre-feet per year and operation pumping to 140 acre-feet per year for the life of the project.
10.8.1		What jurisdiction, if any, does the CEC have over both the entire 10,000 acres the applicant will be leasing and its associated water rights?	Staff is not aware of any CEC jurisdiction over the applicant's water rights. The CEC has authority over the project “site” and “related facilities”.
10.9		What is the current approximate water value and/or rights in terms of acre-feet-per-year that is associated with the 6,800 additional acres that is part of the applicant’s lease agreement?	In most areas of California, overlying land owners may extract percolating groundwater and put it to beneficial use without approval from the State Board or a court. California does not have a permit process for regulation of groundwater use. In several basins, however, groundwater use is subject to regulation in accordance with court decrees adjudicating the groundwater rights within the basins.

10.10		Can the CEC assume jurisdiction over this additional acreage and its associated water resources as a Condition of the Permit, even if the proposed project is not directly active on this portion of the site?	No.
10.11		While the CEC may be able to impose direct limits on water use for the proposed project itself, can the CEC also impose limits on water use regarding the other 6,800 acres that will not be directly a part of the HHSEGS construction and operations?	No.
10.12		If the CEC has no jurisdiction over the other 6,800 acres, will the applicant and/or landowner be capable of developing this acreage and its associated water rights in any manner they see fit without restrictions or limitations if the proposed project is approved?	The applicant would be required to comply with the requirements of the permitting agency responsible for whatever land use is approved at the site. This would require CEQA analysis, including satisfaction of provisions in CEQA requiring assessment of a reliable water source. Inyo County would normally be the permitting agency.
10.13		What are the reasonably foreseeable impacts of the applicant's control of this additional acreage if no restrictions or limitations are incorporated as a Condition of the Permit? Topics may include additional development adjacent to the project site such as temporary worker housing, permanent residential housing, commercial development and/or industrial development, growth-inducing impacts, increased water demand, etc.	The CEC process is a review of the Hidden Hills project only. However, any development on the "site" or of a "related facility" would require an amendment from the CEC.
10.14		Should the current landowner, which is merely leasing the project site to the applicant, choose to induce growth and capitalize on the proposed project's approval on the additional lands he owns surrounding the proposed project site, what control, if any, does the CEC have with respect to limiting or restricting that landowners development of the area and the associated water requirements necessary for that growth?	See answers to 10.8.1 and 10.13, above.

10.15		What impacts will this additional project have on water withdrawal in the project vicinity?	Any additional development that results in significant additional pumping in the vicinity could contribute to water level lowering.
10.16		While the AFC files, subsequent related documents and the Preliminary Staff Assessment occasionally reference Nevada LORS that may be applicable to the proposed project (such as traffic, hazardous materials, waste management, etc.) why has no discussion included Nevada LORS and jurisdictional analysis of the Pahrump Valley Groundwater Basin as well?	The FSA addresses LORS applicable to the project, including California laws and regulations. The impacts to Nevada are addressed in the staff analysis, but a specific analysis of compliance with Nevada laws is not required because the project is in California.
10.17		If the CEC Staff were to incorporate applicable Nevada LORS related to the authorization of water allocations from the Pahrump Valley Groundwater Basin, would the proposed project still be compliant with LORS?	See answer to 10.16, above.
10.18		What dialogue, if any, has the CEC or Inyo County engaged in with the Nevada State Engineer regarding coordinating the shared water resources of the Pahrump Valley Groundwater Basin, which has historically and predominately been used for the public interest of the people of Nevada?	Energy Commission staff has contacted the Nevada State Engineer's office to learn more about their permitting process and understand how it affects project analysis. Staff has also spent significant time researching the water right's and permit process, history, and status of water rights on the Nevada State Engineer's website.
10.19		Is it the applicant's or CEC's intention to circumvent impacts to Nevada or Nevada Water Right Laws in order serve California's interest at the expense of the people of Nevada?	No, the intent is that all impacts to the water basin would be mitigated for, whether the impact is in California or Nevada.
10.20		Why does the CEC Staff believe that subjecting local well owner to significant burdens results in reducing the proposed projects impacts to "less than significant"?	The purpose of the mitigation requirements is that the applicant must pay for impacts to local wells. Well owners do not have to participate in the program. Those that do not participate however cannot be reimbursed.

10.21		If a local well owner does not agree to or comply with the Conditions of Certification, are the projects impacts still reduced to “less than significant”?	Yes. Participation in the program that tracks impacts to local well owners is voluntary and requires well owner approval. Owners that do not participate cannot be compensated.
10.22		If the proposed mitigation measures are based predominately on a 10 ft. drawdown trigger level but the CPM can eliminate the monitoring program, how will the terms and agreements designed to protect the local well owners from project impacts be honored or upheld?	The word "eliminated" was removed from condition WATER SUPPLY-6 in response to this comment.
10.23		If the applicant has sole control over the monitoring network, which will be used as the singular source of data to determine trends, impacts and degrees of significance, what happens in the event that local well owners dispute what the applicant is reporting or how the CEC chooses to interpret those reports?	Local well owners are free to discuss the alleged impacts with CEC staff and be involved in the review of data. Staff does not intend to work around the local well owners.
10.24		In the event a local well owners water supply and/or well is impacted but the CEC/applicant disputes that impact, there are only two reasonably foreseeable options the well owner will have to remedy the impacts; a) they can spend their time and money legally challenging the CEC/applicant’s data and decisions, b) they can spend their time and money fixing the problems so as to regain their water supply. How is either of these options not considered a significant burden on local well owners?	CEC staff is willing to relieve local well owners of this burden. However, much like the environmental review process for the staff analysis, local well owners are free to discuss the alleged impacts with CEC staff and be involved in the review of data. Staff does not intend to work around the local well owners.
10.25		Given the fact that there is currently no development or any other projects capable of producing significant impacts such as the proposed project can, why would Staff stipulate a two-prong requirement for mitigation that includes “water level changes are different from background trends” AND “are caused by project pumping”?	There are currently pumpers in this portion of the PVGB. Staff estimates 17 AFY is currently being used and water levels in this portion of the PVGB are already in decline. The current decline is used to estimate the background trend and is different than the decline and trend that may be caused by the project pumping. Staff is requiring that the applicant mitigate only for impacts resulting from their pumping.

10.26		What is the definition of “significantly affected by Project pumping”? Who makes this determination, the applicant, the CEC or the well owner?	Staff. In absence of specific public guidance to help shape the significance threshold, staff might choose a common significance threshold such as 10% increase in cost.
10.27		Who determines the “impact of drawdown” induced solely by the proposed project?	CEC staff will make that determination.
10.28		Who will be monitoring “any other source” that occurs in the proposed projects vicinity in order to determine proportional impacts and mitigation measures?	It is in the applicant’s interest to discover and report other new pumpers in the area if it looks like they could significantly contribute to drawdown.
10.29		Does the CEC have the authority to require “any other source” of development that may occur over the life of the project to subject themselves to the same terms and conditions the applicant and local stakeholders must agree to so that those sources may be included in the proportional equation of mitigation?	No.
10.30		In the event the CEC eliminates the monitoring program over the life of the proposed project, what methodology, data collection, proof, etc., will local well owners be required to produce that will satisfy the CEC and/or applicant’s requirements for determining merits of impacts?	The CEC will not eliminate the monitoring program. The word "eliminated" was removed from condition WATER SUPPLY-6 in response to this comment. The CEC may always be contacted to help resolve impacts resulting from project operation through the complaint process.
10.31		In the event the CEC eliminates the monitoring program over the life of the proposed project, what methodology, data collection, proof, etc., will local well owners be required to produce that will satisfy the CEC and/or applicant’s requirements for determining merits of impacts induced solely by the proposed project?	See answer to 10.30, above.

10.32		Outside the CEC, which agency in the State of California has the jurisdiction and responsibility to protect the public interest of local well owners and community stakeholders in the project vicinity should those well owners not agree to the terms and conditions set forth by the CEC to accommodate the proposed project?	Staff is not aware of any other state agencies with such authority. In general, groundwater use by overlying landowners is not regulated in California, and pumpers routinely impact one another by lowering each other's water levels by some amount. If chronic water-level declines (overdraft) become unbearable, the principal legal/regulatory remedy is to initiate a court-administered adjudication of groundwater rights. Any basin user can initiate the process, but the process is typically long and expensive.
10.33		In the event the CEC eliminates the monitoring program over the life of the proposed project and a dispute arises regarding the terms, agreements, conditions, stipulations, contract, data, methodology, etc., where will local well owners go to file their grievances and/or receive compensation?	See answer to 10.30, above.
10.34		Why does the local vegetation get an lifetime monitoring mandate but monitoring data and programs that supposedly help local well owners can be revised and/or eliminated after only five years?	See answer to 10.30, above.

Comment #	DATE	COMMENT TOPIC	RESPONSE
11	July 23, 2012	**Intervenor Center for Biological Diversity**	
11.40		The PSA indicates that up to 140 AFY of water will be used yearly on the HHSEGS site during normal operations (PSA at 4.15-2), although construction water use could be as high as 288 AFY for up to three years (PSA at 4.15-8). Although no water will leave the site, additional information on the effects of groundwater pumping on nearby seeps and springs in the adjacent mountains is lacking. In fact the seven-day ground water pump test that the CEC required was never completed. We have repeatedly requested that the seven-day ground water pump test be completed and once again ask the CEC to enforce their own requirement. No data is presented that addresses the hydrological connection between these essential wildlife sustaining locations, the Amargosa drainage and the proposed project impacts.	Neither staff nor the CEC required any pump test as a follow up to the first test. The conditions proposed to protect the springs are conservative. They would require that the project cease pumping when drawdown of 0.5 is projected at the site boundary. There is insufficient information to conclude or quantify a hydrologic connection between project wells and the Amargosa River. Condition WATER SUPPLY-1 requires that at least 100% of project pumping be offset and therefore PVGB outflow would likely not change. Please see staff's analysis of potential Amargosa River impacts in this FSA.
11.4		Additionally, because of the substantial evaporation rate at the project site, please provide data on how much pumped ground water will actually be returned to the groundwater basin.	The current assumption is that none of the water pumped by the proposed HHSEGS project would return to the aquifer.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
13	July 23, 2012	**Applicant, BrightSource Energy, Inc. -- Water Supply, pg. 293**	
13.14		The applicant will retire water rights. The applicant will protect local groundwater users from impacts.	Conditions in the FSA provide a back-up plan in case water rights with a sufficient pump record cannot be retired. The back-up plan allows for the retirement of inactive rights in conjunction with additional monitoring wells west of the project with drawdown triggers.

13.15		1. Staff needs to acknowledge the benefit of the applicant's proposal to retire water. 2. California water law is ambiguous. 3. The alternatives analysis should be constructed differently. 4. The PSA is focused on Nevada. 5. Staff's analysis is too simple. 6. A 0.5-foot decline in water levels is indistinguishable from background decline.	1. In this Final Staff Analysis staff has acknowledged the applicants proposal to offset project water use through retirement of water rights. One outcome of the offset is to also ensure Pahrump Valley underflow discharge remains the same. 2. Comment noted. 3. Comment sent to ENERGY COMMISSION Alternatives staff. 4. Water Supply impacts resulting from the project are evaluated. 5. Staff's analysis is sufficient given available quantitative information on the PVGB and surrounding areas and considers uncertainty in hydrologic conditions. 6. The approach is based on statistically significant trends in historical water levels in PVGB wells.
13.16		Please use our PowerPoint presentation in your analysis.	PowerPoint presentation was considered.
13.17		Please use our PowerPoint presentation in your analysis.	PowerPoint presentation was considered.
13.18		Page 4.15 1, Summary of Conclusion, 3rd paragraph, Item 1: The basin is not in overdraft but is over permitted per the Nevada State Water Engineer. The Nevada State Water Engineer has no authority over water rights in California.	Water levels within the proposed project vicinity show a statistically significant decline indicating groundwater discharge is greater than recharge and the basin is in a state of overdraft. The declines are observed in both Nevada and California portions of the basin.
13.19		Page 4.15 1, Summary of Conclusions, 3rd paragraph, Item 2: We believe the following conclusion is not supported by the data for reasons explained in General Comment 2 above: “If not mitigated, the proposed project pumping could contribute to a water level decline in areas that support groundwater dependent vegetation, including the Stump Springs Area of Critical Environmental Concern.”	Comment noted.

13.20		Page 4.15 1, Summary of Conclusions, 3rd paragraph, Item 3: We believe the following conclusion is not supported by the data for reasons explained in General Comment 2 above: "If not mitigated, the proposed project could substantially lower the water level in neighboring domestic wells."	Comment noted.
13.21		Page 4.15 1, Introduction, 1st paragraph, 1st sentence: Please change "Bright Source Energy" to "the Applicant."	Brightsource Energy is the owner of the project and it should be noted here. The wording was modified to reflect this concern.
13.22		Page 4.15 2, Introduction, 1st full paragraph, last sentence: Please change "HHSG 2011a" to "HHSEGS 2011a."	Done.
13.23		Page 4.15 5, heading: Please change "Hydrogeologic Setting" to "Hydrogeologic Setting."	Done.
13.24		Page 4.15 8, 1st paragraph (partial paragraph), 3rd sentence in paragraph: Please reword the sentence as follows: "Recent water quality analyses from wells on the project site show the groundwater is relatively low in Total Dissolved Solids (between 250 and 361 ppm, based on 2011 and 2012 data) and has a bicarbonate character."	Done.
13.25		Page 4.15 9, Method for Determining Significance, Water Resources, b: Please see comment under Alternatives. The significant impact should be measured against what the current beneficial use impact or potential impacts are. Need to consider what the current entitled draw from the project site would be if full development of residential lots were to occur.	The baseline is current conditions.
13.26		Page 4.15 9, Method for Determining Significance, Water Resources, c: Please define the term "affected" when stating that species or habitats would be affected. This criterion is better suited for the biological resources section.	"Affected" refers to impacts due to lowered water levels.

13.27		Page 4.15 9, Method for Determining Significance, Water Resources, c: The PSA should identify with specificity the legal authorities for these purported significance criteria. Citations to those legal authorities should be included in the FSA.	Comment noted.
13.28		Page 4.15 10, 3rd full paragraph: Please reword the sentence as follows: The long term declining trend estimated by these data is comparable to that estimated for the rest of this portion of the basin and is about 0.37 foot per year, or 4.44 inches per year.	Comment noted. Change not necessary. Terms in feet are most useful for the subject analysis.
13.29		Page 4.15 10, 3rd paragraph: Please provide WATER SUPPLY Figure 15 at a scale similar to that of the other figures. The scaling on this figure makes the slope on the Orchard Well figure look steeper than some of the other figures.	Done.
13.30		Page 4.15 10, 7th full paragraph, 1st sentence: The years 2005 through 2011 represent the period of heaviest drought in the area so are not representative of a trend. In addition, they only cover a span of 6 years, which is not sufficient data to make a determination of trends.	There are 32 to 46 records. Though it is a relatively short record, it is the most complete record within the project vicinity. This record shows a statistically significant trend over the period of record.
13.31		Page 4.15 10, 7th full paragraph, 3rd sentence: The magnitudes of water level changes indicated by Sen's Test for slope indicate that the median water level change in the wells reviewed was about (-)0.273 feet per year (ft/yr), or approximately 3.28 inches per year.	Done (units of in/yr not reported).
13.32		Page 4.15 11, 2nd paragraph, 7th sentence: The PSA states: "The northern portion of the PVGB has an extensive record of pumping that shows an approximate loss in water levels of one foot per year."	Yes. The average change in water levels over the period of record shows a decline in the water table equal to about one foot per year.

13.33		Page 4.15 11, 2nd paragraph, last three sentences: We suggest that the division between the subbasins is at the faults to the east of the site, placing only the Dry Lake Bed Well, Old Orchard Well, and Quail Well in the southern subbasin. This results in an arithmetic mean of (-) 0.18, significantly lower than the mean for all eight wells (-)1.185. This suggests that the boundary of the subbasin is more properly drawn along the faults.	Staff would also include the Stateline well, which would make the arithmetic mean trend about (-)0.23 ft/yr.
13.34		The CEC estimate of storativity is too low. If staff used a value of 0.1 instead of 0.005, the applicant's proposed use of 140 ac-ft/year looks smaller.	Employing a greater storativity value would simulate a greater loss in storage and a lower magnitude of water level decline. However, the use of a higher value for storativity is not supported by the data.
13.35		If CEC used a higher value for storativity, the water level decline induced by the project would be less.	See answer to 13.34, above.
13.36		It is possible the basin has been in overdraft for thousands of years as is evident from the dry lake bed. Thus, this trend will continue with or without development of the plant.	Protecting water supplies is therefore critical.
13.37		Page 4.15 12. 2nd full paragraph: Mitigation requirements (WATER SUPPLY 1) should provide credit for the reduction in water use from allowed current residential use and for the provision of storm water recharge via implementation of best management practices (BMPs).	Existing conditions involve little residential pumping, and the residential build out the comment refers to is at best speculative. Recharge from storm water retention is unlikely given the high clay content in the shallow subsurface. Recharge in the desert rarely occurs at the valley floor because evaporation and evapotranspiration rates are too high and percolation rates are too low. Furthermore the proposed site condition described in the AFC would create a general increase in site runoff due to compaction and reworking of the surface.
13.38		Page 4.15 12, 2nd full paragraph: The PSA states: “This condition requires the project owner to provide a water use offset within the PVGB that is equal to project pumping.” Is this defined as a ratio of 1:1 and any overdraft permitted rights? Meaning active or non active?	The water use mitigation must represent active water rights with a recent pumping history.

13.38		Page 4.15 13, Increased Cost of Pumping, Equation 2: The actual equation for the Cooper Jacob modified non equilibrium method is s=2.30Q/(4piT)log(2.25Tt/r2S). A more robust form of this equation is the Theis equation s=114.6QW(u)/T and u=1.87r2S/Tt with Q in gpm, T in gpd per foot, r in feet and t in days.	All drawdowns calculated for the FSA used the Theis solution rather than its approximate form.
13.40		Page 4.15 13, Increased Cost of Pumping, Equation 2 Assumptions: These are simplifying assumptions used to make the analytical solutions solvable. They are not meant as an expression of real aquifer conditions. They are limitations of the method that clarify how the solution will vary from real world conditions.	Comment noted.
13.41		Page 4.15 15, Thresholds to Determine Significant Impact, 1st sentence: These calculations are based on assumed theoretical aquifer conditions that we believe do not reflect site conditions. Our modeling indicates that drawdown will not propagate to the domestic wells based on the regional gradient.	Simulated drawdown is the impact.
13.42		Page 4.15 15, Thresholds to Determine Significant Impact, 2nd sentence: Please reword this sentence as follows: One threshold therefore could be limiting drawdown to 10 feet below existing conditions or mitigating adverse effects of drawdown greater than 10 feet below existing conditions.	Done.
13.43		Page 4.15 15, Aquifer Parameters, 2nd paragraph, 1st sentence: Curve matching is a long established industry standard. It is the basis for aquifer analysis dating back over 70 years and is not considered subjective. Please revise the PSA to reflect this fact.	The word 'subjective' was removed.
13.44		Staff and applicant show different curve matches for pump test results.	The FSA considers both of the applicant's aquifer test analyses.

13.45		Page 4.15 16, 2nd full paragraph, 1st sentence: The PSA states: "Using staff's estimates of transmissivity and Equation 3 above it is possible water level declines in neighboring wells could be on the order of 10 15 feet after 30 years of project pumping." Is the 10 to 15 inclusive of background declines currently predicted in the PSA by Staff's estimates?	The 10 to 15 feet is the isolated drawdown due solely to the pumping.
13.46		Page 4.15 16, 2nd full paragraph: Actual drawdown for those assumptions is 7.84 feet after 30 years pumping at 101 gpm. This ignores recharge and regional flow. Actual drawdown will be less.	7.84 feet is the simulated drawdown due to the pumping, which by definition is the impact.
13.47		Page 4.15 16, last paragraph, 2nd sentence: The PSA is requiring Applicant to take responsibility for increased pumping costs and maintenance that may be experienced by residents of Charleston View. How is the effect of over pumping from neighbors' wells or from other projects within the basin to be accounted for? The HHSEGS will bear the burden of others' pumping under this scenario. In addition, the condition of certification may incentivize neighboring owners to over pump their wells, by eliminating financial deterrents, thereby hastening overdraft conditions.	The groundwater monitoring plan shall monitor select private wells and proposed project supply and monitoring wells. Data collection shall document background- and pre-construction conditions and trends. The plan would be designed to monitor project related trends that can be quantitatively compared against background and pre-construction conditions.
13.48		Page 4.15 16, last paragraph, 3rd sentence: Conditions of Certification WATER SUPPLY 6 and WATER SUPPLY 7 require monitoring and mitigation of potential impacts to neighboring domestic wells. This should only pertain to impacts above the baseline.	Agreed, language added.
13.49		Page 4.15 17, Groundwater Dependent Vegetation and Stump Springs, 1st paragraph, last sentence: What is the basis for BLM's claim that Stump Springs still produces water at the site intermittently?	Sentence deleted. Staff has provided updated information in the FSA.

13.50		Page 4.15 17, 4th paragraph, 2nd sentence: Both of these assumptions are exceedingly conservative and essentially incorrect. Based upon our aquifer analysis and that of others in the basin, the aquifer is unconfined or leaky artesian; and, the clear existence of a regional groundwater gradient as indicated in Figure 5 of the PSA is a priori indication of the existence of recharge.	The reported water level response in some of the wells could possibly indicate local leaky aquifer conditions. However, the available hydrogeologic information is insufficient to confidently identify the adjoining aquifer that supplied the recharge, the water level changes in the leaky aquifer as a result of the deeper pumping (if different from the water-bearing materials monitored by the shallower monitoring wells), the thickness and extent of the intervening aquitard, and the depth and thickness of the pumped aquifer. Staff therefore was conservative in its approach and employed the Theis equation for a confined aquifer. The groundwater gradient is not relevant to the impact, which is the isolated drawdown due to the pumping.
13.51		Page, 4.15 17, 5th paragraph, 1st sentence: These calculations are based on assumed theoretical aquifer conditions that we believe do not reflect site conditions. Our modeling indicates that drawdown will not propagate to Stump Springs based on the regional gradient and leakance without regard to the likely presence of a permeability barrier in the aquifer created by one or more faults.	Staff was conservative in its approach and employed the Theis equation for a confined aquifer. The groundwater gradient is not relevant to the impact, which is the isolated drawdown due to the pumping. In the FSA, staff included an analysis that assumes the fault zone is an impermeable barrier in its evaluation of potential impacts on water levels west of the fault. Water levels measured under the monitoring program during project operation will confirm whether the fault prevents drawdown from reaching Stump Springs and other habitat areas on the east side of the fault.
13.52		Page 4.15 18, 1st paragraph after Table 5, 2nd sentence: This analysis would only be valid for a fully confined aquifer of infinite extent with no gradient. In reality the site wells are approximately 250 feet lower than Stump Springs and the aquifer is likely bounded by faults that will impede the propagation of drawdown to the springs.	The absence of a hydraulic connection between the site and Stump Springs has yet to be demonstrated. The FSA considers potential impacts with and without an impermeable fault barrier.

13.53		Page 4.15 18, 1st paragraph after Table 5, 3rd sentence: The PSA states that the approach was supported by the Applicant in the AFC. However, such support was given by Applicant prior to performance of the Aquifer Pump Test. Since that time, the belief that in the possibility that the aquifer is confined is no longer held by the Applicant.	Comment noted.
13.54		Page 4.15 18, 1st paragraph after Table 5, 5th sentence: To correctly apply superposition, one must consider the actual flow field and the change in flow that occurs in response to pumping. The cone of depression, superimposed on the sloping potentiometric surface, changes the shape of the surface and causes some of the regional groundwater flux to be diverted to the pumping well. As the cone grows deeper and wider, more water is diverted to the well. At some point, enough water is diverted to the well to replace the water being pumped and the cone of depression no longer expands and a new stable potentiometric surface is established. This does not occur in a theoretical infinite aquifer with no gradient, and such aquifers do not exist. Our modeling shows the cone of depression will stabilize shortly after pumping begins, even with the assumption of no leakance, after which time water levels will no longer decline. This is entirely consistent with the results of the pumping test on site and consistent with normal aquifer responses.	The impact is defined as the volume of water removed (consumed) from the over drafted groundwater basin, and the drawdown of groundwater level due solely to the pumping well. The water consumed is equal to the water extracted. The drawdown attributed solely to the pumping well is isolated at finite locations in the aquifer using superposition. This approach is conservative, as in other aspects of Staff's analysis, to assure the maximum potential impact is considered.
13.55		Page 4.15 18, 1st paragraph after Table 5, 6th sentence: This model was designed to predict worst case conditions before any site data was available. Although the model was intended to incorporate the regional gradient the Winflow modeling package does not factor the gradient into its drawdown calculations. While Winflow does allow a gradient to be specified, it does not include the gradient in the solution but only applies it after the fact to draw the contour lines.	Winflow can be employed to calculate the isolated drawdown due solely to the pumping well, which is defined as the impact.

13.56		Page 4.15 19, 1st paragraph, 2nd sentence: Please provide support for the statement that “any” decline in water levels could result in adverse impacts to groundwater dependent vegetation and define “adverse impacts.”	Please refer to the BIOLOGICAL RESOURCES FSA section for discussion of groundwater impacts to vegetation.
13.57		Page 4.15 20, 1st paragraph (partial), last two sentences: This calculation refers to groundwater flow velocity, which is essentially how long would it take for a drop of water to move to the river. This is different than the propagation of drawdown, which is based on confined storage and transmissivity of the aquifer.	Analysis was removed.
13.58		Page 4.15 20, 2nd paragraph, 3rd sentence: The monitoring program described in WATER SUPPLY 8 will measure water level declines from any source, not just the project. Multiple factors could contribute to the decline.	The groundwater monitoring plan shall monitor and document background- and pre-construction conditions and trends. Using the methods specified in WATER SUPPLY-4 monitoring of project related trends can then be quantitatively compared against background and pre-construction conditions caused by multiple factors.
13.59		Page 4.15 22, Drinking Water, 2nd paragraph, 1st sentence: The HHSEGS is expected to employ **120** full time employees and 50 to 60 shift workers during operations and many more during construction.	Correction made.

13.60		Staff recommends Condition of Certification WATER SUPPLY 10, if groundwater will be used for potable purposes, which that would require the applicant to submit information to the Inyo County Environmental Health Department at least sixty (60) days prior to commencement of construction at the site, that would typically accompany an application obtain for obtain a permit to operate a non transient, non community water system with the Inyo County Environmental Health Department at least sixty (60) days prior to commencement of construction at the site. if groundwater will be used for potable purposes. This condition would ensure that the applicant meets all provisions of Title 22, Section 3 to provide a suitable domestic water supply.	Compliance is required in accordance with state and federal law.
13.61		Page 4.15 23, 1st full paragraph: Please reword this paragraph as follows: Staff also recommends Condition of Certification WATER SUPPLY 3, which would ensure that the domestic wells are constructed or modified in accordance with County standards and registered with the State of California through DWR. The applicant shall submit a well construction packet to the Inyo County Environmental Health Department for review and comment and to the CPM for review and approval. Aa Well Completion Report shall also be submitted to DWR prior to approval.	Change made as requested.
13.62		Page 4.15 23, Cumulative Impacts and Mitigation, 2nd paragraph: These calculations are based on assumed theoretical aquifer conditions that we believe do not reflect site conditions. Aquifer properties have not been determined at the Sandy Valley site.	Due to uncertainty in aquifer conditions staff employed a conservative approach and utilized a range in reported aquifer conditions.
13.63		Page 4.15 24, Basin Balance, 1st paragraph, 1st sentence: The loss in storage attributable to the project would be equal to the pumping at the site, a maximum of 140 AFY, immediately after construction and would decrease to zero once the cone of depression stabilized.	Existing groundwater consumption exceeds recharge; hence the basin is in over draft. Any new consumption therefore increases the depletion of groundwater storage in the basin. Neither staff nor the applicant has identified a source of water that would increase recharge to the basin in response to project pumping.

13.64		Page 4.15 24, Basin Balance, 1st paragraph, 2nd sentence: The loss in storage attributable to the projects would be no greater than the sum of pumping at the sites, a maximum of 317 AFY, immediately after construction if they all started pumping on the same day, and would decrease to zero once the cones of depression stabilized.	Staff removed this section of the analysis.
13.65		Page 4.15 24, Basin Balance, 3rd paragraph, last sentence: Please reword the sentence as follows: Their combined use of up to **317** AFY would represent about **3%** of the basin's safe yield.	Staff removed this section of the analysis.
13.66		Page 4.15 25, State Water Resources Control Board Resolutions, 1st paragraph: This 1975 Resolution is just that, a resolution. Its legal weight is questionable. It also focuses on new appropriations of surface water. It is inapplicable here on the facts.	Staff removed this.
13.67		Page 4.15 26, Order from the Genesis Solar Project Committee, 1st paragraph: This Genesis reference is NOT a decision of the Commission. It was an interim order of the Committee. It is NOT reflected in the Final Decision. This is not precedent because it is not a decision of the Commission. It is also directly contradicts California Water Law, the constitutional sections cited previously, about making reasonable and beneficial use of water. The California Constitution does not require "worst, feasible available water that applicant could use for particular purposes on a project."	Staff removed this.
13.68		Page 4.15 31, Conclusions, Conclusion 2: We believe this conclusion is based on an inaccurate understanding of the pumping impacts. See previous comments.	This Conclusion was revised.
13.69		Page 4.15 31, Conclusions, Conclusion 3: We believe this conclusion is based on an inaccurate understanding of the pumping impacts. See previous comments.	This Conclusion was revised.
13.70		Page 4.15 51, Appendix A	Staff removed this section of the analysis.

13.71		Page 4.15 52, Appendix A	Staff removed this section of the analysis.
13.72		Page 4.15 52, Appendix A	Staff removed this section of the analysis.
13.73		Page 4.15 52, Appendix A	Staff removed this section of the analysis.
13.74		Page 4.15 53, Appendix A	Staff removed this section of the analysis.
13.75		Page 4.15 53, Appendix A	Staff removed this section of the analysis.
13.76		Comments on WATER SUPPLY condition 1	Staff accepted some of the proposed edits.
13.77		Comments on WATER SUPPLY condition 2	Staff would not accept a rolling average for water use. As written the condition is more enforceable.
13.78		Comments on WATER SUPPLY condition 2: Page 4.15 34, WATER SUPPLY 2, Verification, 2nd paragraph "Water usage" is not defined. Does filling onsite storage tanks count as daily water usage? Or only water taken out of the water system count as "usage"? Please define this term.	Water usage is considered removal from the ground.
13.79		Comments on WATER SUPPLY condition 3	Staff cannot comment on the County's internal approval procedure.
13.80		Comments on WATER SUPPLY condition 4	Some edits accepted.
13.81		Comments on WATER SUPPLY condition 5: Page 4.15 36, WATER SUPPLY 5: this condition should be deleted. WC 4999 et al. apply to groundwater extraction in Los Angeles, Riverside, San Bernardino, and Ventura counties only. It does not apply to Inyo County.	Condition was removed.
13.82		Comments on WATER SUPPLY condition 6	Some edits accepted. Staff also accepts the use of the USGS method for tracking water levels. Staff does not agree that a bulk of the condition should move to the Verification section of the condition.

13.83		Comments on WATER SUPPLY condition 7	Staff does not agree that a bulk of the condition should move to the Verification section of the condition.
13.84		Comments on WATER SUPPLY condition 8	Monitoring must begin prior to construction to establish background and baseline conditions. All monitoring wells must also be installed to the same depth as the pumping wells.
13.85		Comments on WATER SUPPLY condition 9: Page 4.15 47. WATER SUPPLY 9. The Applicant's data, as described in these PSA Comments and in its filings in this proceeding, demonstrates that the project will have no significant adverse effects on water supplies. If anything, the Applicant's water usage will be less than the 170 residential units contemplated in the No Project Alternative. Accordingly, given (a) the project's lack of water supply related impacts and (b) the lack of any water discharges associated with project operations, there will be no significant effects on water quality. The Applicant's proposed conditions Water Supply 6 and Water Supply 8 constitute a rigorous monitoring program that will demonstrate the lack of significant impacts in either water supply or water quality. Because no significant impacts on water quality have been identified, the FSA should not seek to impose mitigation. Water Supply 9 should be deleted.	Staff does not plan to remove WATER SUPPLY-9 (now incorporated in WATER SUPPLY-4). The immediate vicinity has a history of nitrate contamination which degraded local drinking water supplies. The project should be required to monitor and report on water quality conditions throughout the life of the project.
13.86		Comments on WATER SUPPLY condition 10	It is staff's understanding that this requirement stems from the federal Safe Drinking Water Act and that the county must be responsible for approving it. The Energy Commission does not have in-lieu permitting authority.

ADDITIONAL RESPONSES TO AGENCY AND PUBLIC COMMENTS

Agency comments received during the Preliminary Staff Assessment process are included below in an abbreviated format. Please visit the commission website to review complete comment letters at http://www.energy.ca.gov/sitingcases/hiddenhills/documents/index.html.

Letter from Amargosa Conservancy, December 28, 2011 (TN-63256)

Comment: *"…we believe that pumping, over time, may adversely affect sensitive water-dependent ecological resources in the lower Amargosa, including several listed and special status species."*

Response: Staff believes that it is speculative that pumping from this project would result in a measureable impact to water-dependent ecological resources in the lower Amargosa River. However, staff is requiring that the applicant offset project pumping with mitigation equal to the project's consumption of groundwater to address PVGB overdraft impacts. Assuming that the Amargosa River eventually receives water that was once beneath the Pahrump Valley, this mitigation would address out-of-basin concerns.

Comment: *"Also, we note that the applicant has stated that its property lease does not end at 30 years, but has claimed the lease terms as "proprietary" and business confidential, and has thus refused to release its conditions. Under that circumstance, the Energy Commission must assume (in accordance with the common business understanding that an enormous investment in infrastructure will likely result in permanent generation facilities on this site) that groundwater pumping will continue, indefinitely."*

Response: Staff agrees that there is the possibility that such an enormous investment could result in groundwater pumping beyond the life of the project. Staff is suggesting that the applicant offset water rights for the entire life of the project. Staff is requiring mitigation that constitutes a true offset for project pumping.

Comment: *"As an initial observation, the groundwater modeling presented by the Applicant in AFC Appendix 5.150 is unacceptably simplistic."*

Response: Staff disagrees with the phrasing "unacceptably simplistic." Staff instead believes that since the Calvada Springs area is poorly defined, the use of superposition may be most appropriate. As discussed in this analysis, the principle of superposition is employed to isolate the direct influence of pumping regardless of water table conditions and other groundwater sources and sinks. This may be the best way to demonstrate the impact of this project's pumping on sensitive receptors.

Comment: *"It is critically important to note that the USGS Death Valley Regional Flow System regional groundwater model (the only accepted regional representation of groundwater flows--although coarse-scaled) posits that groundwater flows from*

Pahrump Valley into the Amargosa River. The Applicant has not used that model in its analyses on project impacts."

Response: Regardless of whether or not the applicant has considered this possible flow condition in their analysis, staff has considered this potential hydraulic connection. Staff concluded the USGS model is not an appropriate tool to analyze this project. Given the scale of the model and the limited data available in the project area that can be used for model calibration, predicted changes would not be more reliable than other methods and thus have little added value for impact analysis.

Comment: *"Although the new geochemical work (anticipated to be released in early 2012) suggests that flow from Pahrump Valley into Chicago Valley and thence into the Amargosa could be less important in comparison to the overall flow system in the Amargosa Basin, those results should be properly placed in a wider context and confirmed by sampling from new wells that need to be drilled in the area between the project site and the Amargosa River."*

Response: Staff agrees that the chemistry of the water that would be pumped by the project should be analyzed to help understand the source and fate of water in the region. Staff is recommending a groundwater monitoring and reporting condition that addresses this concern. Staff has recommended the adoption of Condition of Certification **WATER SUPPLY-4**, which would require the applicant to do groundwater quality sampling and analyses as part of the project's monitoring program.

Comment: *"…the Energy Commission must assume a strong influence of groundwater flow within the basin fill aquifer and the lower carbonate aquifer on springs in the Shoshone -Tecopa area, and that projected drawdown caused by HHSEGS pumping will propagate into and adversely affect the Amargosa Wild and Scenic River."*

Response: The mitigation suggested by staff to offset project pumping maintains the basin water budget and therefore also out-of-basin flow to the river, if any, that exists.

Letter from Inyo County Water Department, January 18, 2012 (TN-63478)

Comment: *"Retirement of water rights is ineffective as mitigation if the retirement does not result in an actual reduction in pumping."*

Response: Staff concurs and has written Condition of Certification **WATER SUPPLY-1** such that it would require the applicant to address this in the proposed mitigation.

Comment: *"…and generally conclude that the principal source of recharge to the basin is from the Spring Mountains to the northeast, groundwater flows to the southwest, and some groundwater exits the basin to the southwest. Faults run parallel to the state line, and may partially buffer the Project site from effects of pumping in the Pahrump area and recharge from the Spring Mountains. These faults are areas of natural groundwater discharge."*

Response: Staff agrees that connectedness between the northern and southern PVGB is unclear. Staff also agrees that faults running parallel to the state line may buffer the proposed site from the effect of pumping in northern PVGB. This concept also agrees with staff's analysis which shows a lower average water level decline in southern PVGB (0.25 foot per year) compared to the average decline observed in northern PVGB (one foot per year).

Comment: *"Prior reports suggest that groundwater from the Pahrump Valley basin flows through the Nopah Range and discharges in the Tecopa/Shoshone/Amargosa River area, but the flow-paths, rates of flow, and sources of water for regional discharge zones are not well known."*

Response: Staff notes that the flow-paths and regional discharge zones for the PVGB is not well understood. This comment is similar to one shared by the Amargosa Conservancy (TN-63256).

Comment: "*The circumstances discussed above suggest a number potential adverse effects from the Project:*

1. Pumping for the Project may adversely affect well owners near the Project. Active wells have been identified south of the Project site."

Response: Staff agrees and is suggesting mitigation measures for local wells in Condition of Certification **WATER SUPPLY-4** and**-5**.

Comment: *"2. Pumping for the Project may adversely affect phreatophytic vegetation northeast of Project. Zones of phreatophytic vegetation have been mapped northeast of the site."*

Response: Staff agrees that pumping may adversely affect phreatophytic vegetation to the northeast of the project and has recommended Condition of Certification **WATER SUPPLY-4** to mitigate for this effect.

Comment: *"3. Pumping for the Project may affect groundwater users down-gradient from Pahrump Valley, in the Tecopa/China Ranch/Amargosa River area. These potentially affected users may not have all been identified, but include China Ranch and Tecopa."*

Response: This comment has been addressed in responses regarding impacts to the Amargosa River above.

Comment: *"4. Pumping for the Project may adversely affect groundwater-dependent and groundwater influenced habitat down-gradient of the Project. Of particular concern are the Amargosa River and China Ranch."*

Response: Same response as that above.

Comment: *"5. Pumping for the Project may contribute to overdraft of the Pahrump Valley groundwater basin."*

Response: Addressed in previous responses. Staff concurs and has recommended mitigation for potential impacts.

Comment: *"In view of the foregoing, the County of Inyo has proposed the following to Hidden Hills Solar:*

A. Prior to the commencement of construction, Hidden Hills Solar shall cooperate with the County to complete and provide to the CEC and other interested agencies an inventory of private wells potentially affected by the Project that identifies the owner of each well and includes the location, depth, screened interval, pump depth, static water level, pumping water level, and capacity of each well. For each such well, Hidden Hills Solar shall assess any projected impact of the Project on the well and shall develop and submit a plan for monitoring and mitigating any adverse effects on the well, including thresholds where mitigation activities would be undertaken. The plan should include, as feasible, agreements from the owner of each well approving monitoring activities. Monitoring should include both groundwater elevation and water quality. Mitigations should include deepening or replacing wells that become inoperable due to Project pumping, monetary compensation for additional pump lift incurred by Project pumping, and mitigation for impacts to water quality."

Response: Staff agrees and has recommended Condition of Certification **WATER SUPPLY-4 and -5** to mitigate these potential impacts.

Comment: *"C". Prior to the commencement of construction, Hidden Hills Solar shall develop and provide to the County and the CEC and other interested agencies a model for predicting changes in the groundwater flow system resulting from the Project which has the capability to assess changes in hydraulic head, flow rate, flow direction, and water budget. Hidden Hills Solar shall also provide to the County, the CEC and other interested agencies model runs which predict effects of the planned groundwater pumping by the Project on the habitats and resources described above and predictions of the level of groundwater pumping that will cause significant impacts on such habitats and resources. Hidden Hills Solar shall also use the model to provide an evaluation of the sustainability of the water supply for the life of the project, including the cumulative sustainability when considered with other pumping occurring or projected to occur in the groundwater basin (including the California and Nevada portions of the basin)."*

Response: Response to the appropriateness of an extensive groundwater model is discussed in responses to the Amargosa Conservancy above. There is currently very limited data available for the southern portion of the PVGB. The ability to develop a calibrated model that could be used for analysis of well interference, cumulative overdraft, groundwater dependent vegetation, and regional impacts could be difficult and time consuming. Much more research into groundwater basin conditions and long term monitoring data would be needed. Staff believes the monitoring program proposed in Condition of Certification **WATER SUPPLY-4** would adequately measure potential project impacts which could then be mitigated in accordance with **WATER SUPPLY-1** and **-5**, and **Bio-23**.

Letter from Nye County Water District, January 31, 2012 (TN 63651)

Comment: *"Some areas within the Pahrump Basin have experienced drops in water level and the basin has been designated by the Nevada State Engineer as a basin in need of administration (Designated Basin). As a designated basin there are no additional appropriations of water rights and any use would require purchase of existing water rights. Water Districts are accorded special status to assist and advise the State Engineer in the administration of designated basins."*

Response: Staff acknowledges that PVGB has experienced significant water level declines. The information provided about water rights availability was very helpful for developing a satisfactory mitigation measure to offset the project's water uses. In this analysis staff recommends the purchase of an existing water right(s) to offset the proposed use. Furthermore, staff has expressed the need for any purchased water right to constitute an exercised right, or one that has contributed to the current state of declining water levels in the basin.

PROPOSED FINDINGS OF FACT

Based on the evidence, staff proposes the following findings:

1. The proposed HHSEGS site would pump groundwater from the PVGB.

2. Domestic well owners are located adjacent to or within 3 miles of the project site.

3. The proposed project is bordered by sensitive groundwater-dependent vegetation, which is habitat for endemic species.

4. The proposed project is located within five miles of the Stump Spring Area of Critical Environmental Concern (ACEC).

5. The Stump Spring ACEC is designated for protection by the United States Bureau of Land Management (BLM) because of its cultural and biological resources.

6. There is limited data available for site specific analysis of potential effects due to project use of groundwater from the PVGB.

7. Monitoring project groundwater pumping would provide data that could be used to evaluate effects on the existing groundwater users and groundwater dependent vegetation.

8. The PVGB is a basin that has for many years been in “overdraft”, such that recharge of the basin has been exceeded, and continues to be exceeded, by groundwater pumping.

9. The historic overdraft of the PVGB continues today, and Nevada has made it a “designated” basin to control groundwater pumping on the Nevada sideof the border by requiring permits for non-domestic groundwater pumping.

10. Without mitigation, the impact of the project would be cumulatively significant.

11. There is a high level of uncertainty regarding potential impacts from project groundwater pumping, particularly with regard to the potential impact on local springs and wells.

12. The Stump Spring ACEC, with temporal springs and vegetation, may be dependent on local groundwater levels, and could be significantly affected by project groundwater pumping.

13. Local domestic wells, particularly those most proximate to the project site, could be significantly affected by project groundwater pumping.

14. Although it is possible that project groundwater pumping could eventually have a deleterious effect on the Amargosa River, no existing information or model can establish or describe such effect or its extent.

15. Impacts to the PVGB can be mitigated to a level that is less than significant by restricting groundwater use in the Nevada part of the basin by some commensurate level.

16. Restricting groundwater use in the PVGB should reduce impacts, if any, to the Amargosa River.

17. Local well monitoring with defined thresholds and compensation can mitigate impacts to local wells to a level that is less than significant

18. Monitoring wells, coupled with thresholds that require changing water supply sources or reduced pumping, can mitigate impacts to Stump Spring ACEC to a level that is less than significant.

CONCLUSIONS

Based on the assessment of the proposed Hidden Hills Solar Electric Generating System (HHSEGS), California Energy Commission (Energy Commission) staff concludes that:

1. If not mitigated, the proposed project would exacerbate overdraft conditions in the Pahrump Valley groundwater basin. **WATER SUPPLY-1** would require the proposed project to mitigate for its groundwater use by offsetting it through a measure that would constitute a real water savings for the basin. To be effective, such offset must be associated with a documented pumping and water use history, and could not be replaced by alternative water rights.

2. Staff recommends condition of certification **WATER SUPPLY-2** which expressly limits the applicant's water use. Staff also proposes **WATER SUPPLY-3,** which requires the applicant to construct and report well-related information in accordance with appropriate LORS and install metering devices to ensure accurate reporting of water use.

3. If not mitigated, the proposed project pumping could exacerbate water level declines. Accordingly, staff proposes a monitoring plan in the conditions of certification. **WATER SUPPLY-4** monitors groundwater conditions for potential impacts on existing neighboring wells, groundwater dependent vegetation, the Stump Spring Area of Critical Environmental Concern (ACEC), and groundwater quality. The monitoring is designed to prevent potential impacts to groundwater dependent vegetation, among the other noted concerns, and therefore also compliments conditions recommended in the Biological Resources section. Staff proposes a monitoring program in condition of certification **WATER SUPPLY-5** to mitigate potential drawdown impacts in existing wells. **WATER SUPPLY-6** recommends a plan to monitor land subsidence as a result of declining water levels and aquifer dewatering that potentially may occur as a result of pumping.
4. Given the lack of evidence for a hydraulic connection, the relatively large intervening distance (about 20 miles), and uncertainty in potential flow barriers and permeability contrasts within the subsurface it would be speculative to conclude that project, pumping would adversely affect the Amargosa River. There is no available data that identifies groundwater flow paths or confirms a hydraulic connection between PVGB and the Amargosa River, so the water consumed by project pumping may or may not be a source of inflow to the Amargosa River. Although staff concludes that a significant impact due to project pumping is unlikely, **WATER SUPPLY-1** which requires an offset of project water use in the PVGB would ensure there is likely no net overall change in subsurface outflow from the PVGB that might affect the Amargosa River.

5. Staff recommends condition of certification **WATER SUPPLY-7**, which would require the applicant to obtain a permit to operate a non-transient, non-community water system with the Inyo County Environmental Health Department at least sixty (60) days prior to commencement of construction at the site. This condition would ensure

that the applicant meets all provisions of Title 22, Section 3 to provide a suitable domestic water supply.

With implementation of the conditions of certification listed below, the proposed HHSEGS project would comply with all applicable LORS, and would not result in any unmitigated significant impacts related to **WATER SUPPLY** resources.

PROPOSED CONDITIONS OF CERTIFICATION

WATER USE OFFSET PLAN

WATER SUPPLY-1 The Project owner shall submit a Water Supply Plan that will identify how the project would mitigate project overdraft impacts to Pahrump Valley Groundwater Basin (PVGB). These activities shall result in replacement of 288 acre feet per year for construction and 140 acre-feet per year for groundwater pumped from the PVGB during project operation. Replacement shall occur or be in implementation; by the time the project begins to pump groundwater for construction. The activities proposed for mitigation may include, but are not limited to, retirement of active and senior water rights, forbearance of water use, and water conservation. The proposed method would be outlined in the Water Supply Plan to be submitted to the CPM for review and approval.

The Water Supply Plan shall include the following at a minimum:

1. Identification of the activity and water source that would replace 288 acre feet per year for construction and 140 acre-feet per year for groundwater pumped from the PVGB during project operation;
2. Demonstration of the project owner's legal entitlement to the water or ability to conduct the activity;
3. Assessment of whether any artificial recharge of groundwater can be achieved while using storm water controls in accordance with **SOILS-5** and **SOILS-6** or other methods..If recharge can be achieved then the volume recharged can be used to offset project water use in accordance with this condition.
4. Include a discussion of any needed governmental approval of the identified activities, including a discussion of the discussion of the conditions of approval;
5. Discuss whether any governmental approval of the identified activities would be needed, and, if so, whether that approval would require compliance with CEQA or NEPA;
6. Demonstration of how water pumped from the PVGB would be replaced for each of the activities;
7. An estimated schedule for completion of the activities;
8. Performance measures that would be used to evaluate the amount of water replaced by the activities;
9. Monitoring and Reporting Plan outlining the steps necessary and proposed frequency of reporting to show the activities are achieving the intended benefits and replacing PVGB extractions.

The project owner shall implement the activities reviewed and approved in the Water Supply Plan in accordance with the agreed upon schedule in the Water Supply Plan. If agreement on identification or implementation of mitigation

activities cannot be achieved the project owner shall not begin construction or operation until assurance that the agreed upon activities can be identified and implemented.

Verification: The project owner shall submit a Water Supply Plan to the CPM for review 120 days prior to start of construction. Construction or operation pumping will not begin until the Water Supply Plan has been approved by the CPM and implemented by the project owner.

CONSTRUCTION AND OPERATIONS WATER USE

WATER SUPPLY-2 The proposed project's use of groundwater for all construction activities shall not exceed an average rate of 288 acre-feet per year of construction. The proposed project's use of groundwater for all operations and domestic use activities shall not exceed 140 acre-feet per year.

Prior to the use of groundwater for construction, the project owner shall install and maintain metering devices as part of the water supply and distribution system to document project water use and to monitor and record in gallons per month the total volume(s) of water supplied to the project from this water source. The metering devices shall be of an adequate design for the intended use and shall be operational for the life of the project. Metering devices shall be calibrated and maintained in accordance with the manufacturers recommended procedures and schedule.

Verification: Beginning six (6) months after the start of construction, the project owner shall prepare a semi-annual summary report of the amount of water used for construction purposes. The summary shall include the monthly water usage in gallons. The report shall also include photographs and documentation showing the type of meter and installed condition.

The project owner shall prepare an annual summary report, which will include daily usage, monthly range and monthly average of daily water usage in gallons per day, and total water used on a monthly and annual basis in acre-feet by source. For years subsequent to the initial year of operation, the annual summary report will also include the yearly range and yearly average water use by source. For calculating the total water use, the term "year" will correspond to the date established for the annual compliance report submittal. The report shall also include reports on meter calibration and maintenance, and document it is in working order.

PROJECT GROUNDWATER WELLS

WATER SUPPLY-3 PRE-WELL INSTALLATION The project owner proposes to construct and operate six groundwater production wells onsite that will produce water from the Pahrump Valley basin. The project owner shall ensure that each well is completed in accordance with all applicable state and local water well construction permits and requirements, including Inyo County code Chapter 14.28 Water Wells. Prior to initiation of well construction activities, the project owner shall submit for review and comment a well construction packet to the Inyo County Environmental Services and fees

normally required for county well permits, with copies to the CPM. The Project shall not construct a well or extract and use groundwater without CPM approval to construct and operate the well.

POST-WELL INSTALLATION. The project owner shall provide documentation to the county with copies to the CPM that the well has been properly completed. In accordance with California's Water Code section 13754, the driller of the well shall submit to the DWR a Well Completion Report for each well installed. The project owner shall ensure the Well Completion reports are submitted. The project owner shall ensure compliance with all county water well standards and requirements for the life of the wells and shall provide the CPM with two (2) copies each of all monitoring or other reports required for compliance with the Inyo County Environmental Health Services water well standards and operation requirements, as well as any changes made to the operation of the well.

DESTRUCTION OF WELLS. On property controlled by the project owner the project owner shall protect groundwater resources by abandoning all groundwater wells that will not be used for project purposes. These groundwater wells shall be abandoned in accordance with all applicable state and local water well abandonment requirements, including the California Department of Water Resources Bulletins 74-81 & 74-90. Prior to the start of well construction activities, the project owner shall submit for review and comment a well abandonment packet to Inyo County, in accordance with the Inyo County Code Title 14, Chapter 14.28, containing the documentation, plans, and fees normally required for the county's well abandonment permit, with copies to the CPM for review and approval.

Verification: The project owner shall do all of the following:

1. No later than sixty (60) days prior to the construction of the onsite groundwater production wells, the project owner shall submit to the CPM a copy of the water well construction packet submitted to the Inyo County Environmental Health Services for review and comment.

2. No later than thirty (30) days prior to the construction of the onsite groundwater production wells, the project owner shall submit a copy of written concurrence received from the Inyo County Environmental Health Department that the proposed well construction activities comply with all county well requirements and meet the requirements established by the county's water well permit program for review and comment

3. No later than sixty (60) days after installation of each well at the project site, the project owner shall ensure that the well driller submits a Well Completion Report to the DWR with a copy provided to the CPM. The project owner shall submit to the CPM, together with the Well Completion Report, a copy of well drilling logs, water quality analyses, and any inspection reports.

4. During well construction and for the operational life of the well, the project owner shall submit two (2) copies each to the CPM of any proposed well construction or operation permit changes and shall submit copies within ten (10) days of submittal to or receipt from the Inyo County Environmental Health Services for review and comment and to the CPM for review and approval.

5. No later than fifteen (15) days after completion of the onsite groundwater production wells, the project owner shall submit documentation to the CPM, and the Lahontan RWQCB that well drilling activities were conducted in compliance with Title 23, California Code of Regulations, Chapter 15, Discharges of Hazardous Wastes to Land, (23 CCR, sections 2510 et seq.) requirements and that any onsite drilling sumps used for project drilling activities were removed in compliance with 23 CCR section 2511(c).

6. No later than 180 days after the start of project construction the project owner shall provide a plan showing the results of a site survey to identify abandoned wells and a schedule for completion of abandonment of wells for CPM review and approval. Abandonment shall be conducted in accordance with the approved plan.

GROUNDWATER MONITORING AND REPORTING FOR IMPACTS AND MITIGATION FOR GROUNDWATER-DEPENDENT VEGETATION, NEIGHBORING WELLS, AND WATER QUALITY

WATER SUPPLY–4 The project owner shall submit a Groundwater Monitoring, Mitigation, and Reporting Plan (GMMRP) to the Inyo County Water Department for review and to the CPM for review and approval in advance of construction activities and prior to the operation of onsite groundwater supply wells. The plan shall monitor select private wells and proposed project supply and monitoring wells. It shall explain the timing and methodology for monitoring site and off-site groundwater levels and quality. The monitoring period shall include pre-construction, construction, and project operation. The report shall document background conditions and pre-construction conditions and trends and plans to monitor project related trends that can be quantitatively compared against background and pre-construction conditions near project pumping wells and near potentially impacted resources (groundwater dependent ecosystems and domestic wells).

The GMMRP shall include a scaled map showing the site and vicinity, existing well locations, and proposed monitoring well locations (both existing wells and new monitoring wells proposed for construction). The map shall also include relevant natural and man-made features (existing and proposed as part of this project).

The monitoring network is intended to protect groundwater dependent vegetation, other groundwater users and groundwater quality that may be within the influence of project pumping during the project life. The projected area of groundwater drawdown shall be refined on an annual basis during project construction and every year during project operations using the data acquired in fulfillment of this condition. The GMMRP also shall provide: (1)

available well construction information and borehole lithology for each existing well proposed for use as a monitoring well; (2) description of proposed design, drilling and installation methods for new monitoring and water supply wells; and, (3) schedule for completion of the work for all existing wells included in the monitoring network. The GMMRP shall include a well survey that documents the drilling methods employed to construct existing wells, the individual well construction as-builds, borehole lithology recorded from the drill cuttings, well development, geophysical survey, and well survey results—to the extent the information is available—and describe how the well is designed to provide groundwater level and quality samples that would be appropriate for measurement of water levels and quality. The well survey shall measure the location and elevation of the top of the well casing and reference point for all water level measurements, and shall include the coordinate system and datum for the survey measurements for all existing and proposed wells.

A. Prior to Project Construction

1. A well reconnaissance shall be conducted to investigate and document the condition of existing water supply wells located within 3 miles of the project site boundary, provided that access is granted by the well owners. The reconnaissance shall include sending notices by registered mail to all property owners within a 3 mile radius of the project area, shall identify the owner of each well, and shall include the location, depth, screened interval, pump depth, static water level, pumping water level, and capacity of each well, to the extent such information is reasonably available or can be measured. The plan should include agreements from the owner of each well that approves participation in the monitoring activities.

2. The project owners shall install up to 11 monitoring wells, subject to the ability to gain access and the right to use certain off-site well locations. All newly constructed monitoring wells shall be constructed consistent with appropriate Federal, State and Inyo County specifications.

3. The monitoring plan and network of monitoring wells shall make use of existing and new monitoring wells installed by the project owner. All monitoring wells shall be installed to a depth that matches the depth of the project pumping wells. The monitoring network shall include the following wells at a minimum:

    - Three wells (Power Block 1 Onsite Monitoring Wells) directly up-gradient (gradient hereafter refers to groundwater potentiometric surface identified in **Water Supply Figure 4**) from the Power Block 1 production well, in a linear array, within the property boundary. Wells shall be installed within one-half mile of the Power Block 1 production well at different distances from the production wells.

- One well (Power Block 1 Offsite Monitoring Well) directly up-gradient from the Power Block 1 production well, between 1.0 and 1.5 miles from the project property boundary at the western edge of the mesquite bosque on BLM land (herein known as the BLM Mesquite Bosque Well 1) .
- Three wells (Power Block 2 Onsite Monitoring Wells) directly up-gradient from Power Block 2, in a linear array, within the property boundary. Wells shall be installed within one-half mile of the Power Block 1 production well at different distances from the production wells.
- One well (Power Block 2 Offsite Monitoring Well) directly up-gradient from Power Block 2, between 1.0 and 1.5 miles from the project property boundary (BLM Mesquite Bosque Well 2).
- One well (Southern Monitoring Well) at the southern end of the site within the project boundaries.
- One well (Northern Monitoring Well) at the northern end of the site within the project boundaries.
- One well (Offsite California Monitoring Well between 0.5 and 1.0 miles from the southwest corner of the site, located between a bearing of southwest (225°) and west (270°). An alternative location can be approved by the CPM.

4. As authorized access allows, measure groundwater levels in the off-site background wells and on-site pumping and monitoring wells to provide preconstruction groundwater level trends. Construct water level maps of the PVGB for the area within 3 miles of the site boundary using the preconstruction groundwater data. Update trend plots and statistical analyses as data becomes available. The CPM may also modify the frequency of measurement required in Section B. and C., below, depending on the trends demonstrated by the monitoring results.

5. Commence water quality monitoring to establish pre-construction groundwater quality conditions in the monitored wells.

6. Prior to use of any groundwater for construction, all baseline groundwater level and quality monitoring data shall be reported to the CPM. The report shall include the following:

   a) An assessment of pre-project groundwater levels and a summary of available weather information (monthly average temperature and rainfall records from the nearest weather station).

   b) An assessment of pre-project groundwater quality with groundwater samples analyzed for TDS, chloride, nitrates, major cations and anions, coliform bacteria, radioactivity, taste and odor, oxygen-18 and deuterium isotopes. The report to the CPM shall assess the

utility of these constituents for future monitoring. Any recommendations to add or remove constituents shall be supported with the data and other relevant factual evidence. The CPM shall finalize the required list of constituents to be analyzed based on these recommendations and review of two years of monitoring results. The CPM may also modify the frequency of sampling required in Section B. and C., below depending on the trends demonstrated by the monitoring results.

c) The data shall be tabulated, summarized, and submitted to the CPM. The data summary shall include the range (minimum and maximum values), average, and median for each constituent analyzed. If a sufficient number of data points are available, the data shall also be analyzed using the Mann-Kendall test for trend at 90 percent confidence to assess whether pre-project water quality trends, if any, are statistically significant.

B. During Construction:

1. Continuously collect water levels (every hour at minimum) using a pressure transducer from wells within the monitoring network and report water levels on a monthly basis throughout the construction period and at the end of the construction period. If non-vented pressure transducers are being utilized for water levels, a separate pressure transducer shall be used to collect data at the same frequency collected from well pressure transducers. Perform statistical trend analysis on the water level data. Assess apparent trend and delineate project-induced drawdown using the distance-drawdown method and the method described in USGS Scientific Investigations Report 2006-5024, or by using an alternative trend analysis approved by the CPM. Measured water levels shall be analyzed using the USGS trend analysis methods to remove extraneous factors such as local decline, pumping from other locations, and barometric effects. Statistically significant pre-construction and background trends, if any, shall be removed from the observed water levels trends. The remaining drawdown will be presumed to represent the project-related-drawdown, and the project-related-drawdown will be plotted on a distance-drawdown semi-log plot. Statistical analysis and projected drawdown estimates shall be calculated at intervals frequent enough to detect a decline in water levels that will extend to the project boundary and determine if and when the trigger specified in D.1 may be reached.

2. During project construction, the project owner shall monthly monitor the quality of groundwater and changes in groundwater quality in the monitoring network and submit data semiannually to the CPM. The summary report shall document water quality monitoring methods, the water quality data, water quality plots, and a comparison between pre-

and post-construction water quality trends as itemized below. The report shall also include a summary of actual water use conditions.

a) Groundwater samples from all wells in the monitoring well network shall be analyzed and reported semiannually for the constituent list approved by the CPM as part of A.6.b.

b) The compliance data shall be analyzed for both trends and for contrast with the pre-project data. For analysis purposes, pre-project water quality shall be defined by samples collected prior to project construction as specified above, and compliance data shall be defined by samples collected after the construction start date.

i. Trends shall be analyzed using the Mann-Kendall test for trend at the 90 percent confidence. Trends in the compliance data shall be compared and contrasted to pre-project trends, if any.

ii. The difference between pre-project and compliance mean or median concentrations shall be compared using an Analysis of Variance (ANOVA) or other appropriate statistical method approved by the RWQCB for evaluation of water quality impacts. A parametric ANOVA (for example, an F-test) can be conducted on the two data sets if the residuals between observed and expected values are normally distributed and have equal variance, or the data can be transformed to an approximately normal distribution. If the data cannot be represented by a normal distribution, then a nonparametric ANOVA shall be conducted (for example, the Kruskal-Wallis test). If a statistically significant difference is identified at 90 percent confidence between the two data sets, the monitoring data are inconsistent with random differences between the pre-project and baseline data indicating a significant water quality impact from project pumping may be occurring.

iii. Contour maps of cumulative change in water level since the start of the project shall be prepared.

C. During Operation:

1. Continuously collect water levels (every hour at minimum) using a pressure transducer from wells within the monitoring network and report water levels on a monthly basis for the first year of operation and quarterly thereafter. If non-vented pressure transducers are being utilized for water levels, a separate pressure transducer shall be used to collect data at the same frequency collected from well pressure transducers. Operational parameters (i.e., pumping rate and time of pumping) of the water supply wells shall be monitored and reported. Additionally, quarterly groundwater use in the southern PVGB shall be estimated based on available land and water use information.

2. On an annual basis, perform statistical trend analysis of water level data and compare to predicted water level declines due to project pumping. Assess apparent trend and delineate project-induced drawdown using the distance-drawdown method and the method described in USGS Scientific Investigations Report 2006-5024, or by using an alternative trend analysis approved by the CPM. Observed changes in water level in the monitoring wells shall be analyzed using the USGS trend analysis methods to remove extraneous factors such as local decline, pumping from other locations, and barometric effects. Statistically significant pre-construction and background trends, if any, shall be removed from the observed water levels trends. The remaining drawdown will be presumed to represent the project-related-drawdown, and the project-related-drawdown, which shall be plotted on a distance-drawdown semi-log plot.

3. During the first year of project operation, the project owner shall monthly monitor the quality of groundwater and changes in groundwater quality in the monitoring network and submit data semiannually to the CPM. After the first year of project operation, the project owner shall quarterly monitor the quality of groundwater and changes in groundwater quality in the monitoring network and submit data semiannually to the CPM. The summary report shall document water quality monitoring methods, the water quality data, water quality plots, and a comparison between pre- and post-construction water quality trends as itemized below. The report shall also include a summary of actual water use conditions.

   a) Groundwater samples from all wells in the monitoring well network shall be analyzed and reported semiannually for the constituent list approved by the CPM as part of A.6.b.

   b) The compliance data shall be analyzed for both trends and for contrast with the pre-project data. For analysis purposes, pre-project water quality shall be defined by samples collected prior to project construction as specified above, and compliance data shall be defined by samples collected after the construction start date.

      i. Trends shall be analyzed using the Mann-Kendall test for trend at the 90 percent confidence. Trends in the compliance data shall be compared and contrasted to pre-project trends, if any.

      ii. The difference between pre-project and compliance mean or median concentrations shall be compared using an Analysis of Variance (ANOVA) or other appropriate statistical method approved by the RWQCB for evaluation of water quality impacts. A parametric ANOVA (for example, an F-test) can be conducted on the two data sets if the residuals between observed and expected values are normally distributed and

have equal variance, or the data can be transformed to an approximately normal distribution. If the data cannot be represented by a normal distribution, then a nonparametric ANOVA shall be conducted (for example, the Kruskal-Wallis test). If a statistically significant difference is identified at 90 percent confidence between the two data sets, the monitoring data are inconsistent with random differences between the pre-project and baseline data indicating a significant water quality impact from project pumping may be occurring.

iii. Contour maps of cumulative change in water level since the start of the project shall be prepared.

D. Mitigation During Construction and Operation

1. If water levels in either of the Power Block 1 or Power Block 2 Onsite Monitoring Wells identify a projected 0.5 foot or greater water level decline at the property boundary due to project pumping during construction or operation, the project owner shall comply with BIO-23 and reduce, modify, or stop project pumping until the project owner can show:

   - the pumping can be reduced or modified to maintain groundwater levels above the 0.5 ft. drawdown threshold at the project boundary; or

   - the drawdown trigger was exceeded due to factors other than the project pumping and the project did not contribute to the drawdown; or

   - through vegetation monitoring and soil coring described in **BIO-23** and predictive water level trend analysis in C.2. of this condition, that a greater groundwater drawdown will not result in significant adverse impacts to the groundwater dependent vegetation.

2. If the CPM concludes water levels in neighboring wells have been lowered beyond pre-project water levels, then the project owner shall provide mitigation to the impacted well owner(s). Mitigation shall be provided to the impacted well owners that experience 10 feet or more of project-related drawdown (under static, non-pumping conditions). The type and extent of mitigation shall be determined by the amount of water level decline induced by the project, the type of impact, and site specific well construction and water use characteristics. If an impact is determined to be caused by drawdown from more than one source, the level of mitigation provided shall be proportional to the amount of drawdown induced by the project relative to other sources. In order to be eligible, a well owner must provide access to the project owner to document well location and construction, including pump intake depth,

and that the well was constructed and usable before project pumping was initiated. The mitigation of impacts shall be determined as follows:

a) If project pumping has lowered water levels by 10 feet or more and increased pumping lifts, increased energy costs shall be calculated. Payment or reimbursement for the increased costs shall be provided at the option of the affected well owner on an annual or one-time lump sum basis. In the absence of specific electrical use data supplied by the well owner, the project owner shall use **WATER SUPPLY-5** to calculate increased energy costs.

b) If groundwater monitoring data indicate project pumping has lowered water levels below the top of the well screen or slots (if known), and the well yield is shown to have decreased and is no longer capable of meeting 110-percent of the well owner's maximum daily demand, dry-season demand, or annual demand – assuming the pre-project well yield documented by the initial well reconnaissance met or exceeded these yield levels – compensation shall be provided for the diagnosis and maintenance to treat and remove encrustation from the well screen or slots. Reimbursement shall be provided at an amount equal to the customary local cost of performing the necessary diagnosis and maintenance for well screen encrustation. Should the well yield reductions be recurring, the project owner shall provide payment or reimbursement for periodic maintenance throughout the life of the project. If with treatment the well yield is incapable of meeting 110-percent of the well owner's maximum daily demand, dry season demand, or annual demand the well owner should be compensated by reimbursement or well replacement.

c) If project pumping has lowered water levels to significantly impact well yield so that it can no longer meet its intended purpose, causes the well to go dry, or cause casing collapse, payment or reimbursement of an amount equal to the cost of deepening or replacing the well shall be provided to accommodate these effects. Payment or reimbursement shall be at an amount equal to the customary local cost of deepening the existing well or constructing a new well of comparable design and yield (only deeper). The demand for water, which determines the required well yield, shall be determined on a per well basis using well owner interviews and field verification of property conditions and water requirements compiled as part of the pre-project well reconnaissance. Well yield shall be considered significantly impacted if it is incapable of meeting 110-percent of the well owner's maximum daily demand, dry-season demand, or annual demand – assuming the pre-project well yield documented by the initial well reconnaissance met or exceeded these yield levels.

d) The project owner shall notify any private well owners of the impacted wells within one month of the CPM approval of the compensation analysis for increased energy costs.

e) Pump lowering – In the event that groundwater is lowered as a result of project pumping to an extent where pumps are exposed but well screens remain submerged the pumps shall be lowered to maintain production in the well. The project owner shall reimburse the impacted well owner for the costs associated with lowering pumps.

f) Deepening of wells – If the groundwater is lowered enough as a result of project pumping that well screens and/or pump intakes are exposed, and pump lowering is not an option, such affected wells shall be deepened or new wells constructed. The project owner shall reimburse the impacted well owner for all costs associated with deepening existing wells or constructing new wells shall be borne by the project owner.

3. If the Project's pumping is proven to not be contributing to the water level decline in mesquite habitat projected at the site boundary, the trigger for action can be revised in increments of 0.5 foot. In this case, D.1. would be revised to 1.0 foot, 1.5 feet, etc. The revision of the trigger set in D.1. is dependent on the project owner's demonstration that project pumping is not responsible for the decline in the vigor of mesquite habitat adjacent to the property and around the Stump Spring ACEC. This revision to the condition also requires CPM approval.

4. Groundwater quality data shall be used to ensure the project owner complies with the requirements of WATER SUPPLY-7. If the water quality data show that project pumping is causing a decline in water quality that could lead to exceedance of the allowable Water Quality Objectives for beneficial uses of the PVGB the project owner shall prepare an engineering report consistent with the RWQCB requirements for protection of beneficial uses (See also SOILS-9, Septic System). It is the Commission's intent that these requirements be enforceable by both the Commission and the Lahontan RWQCB. Accordingly, the Commission and the RWQCB shall confer with each other and coordinate, as needed, in enforcement of the requirements for any measures that may be required to protect beneficial uses.

5. If mitigation includes monetary compensation, the project owner shall provide documentation to the CPM that compensation payments have been made by March 31 of each year of project operation or, if lump-sum payments are made, payment is made by March 31 following the first year of operation only. Within 30 days after compensation is paid, the project owner shall submit to the CPM a compliance report describing compensation for increased energy costs necessary to comply with the provisions of this condition.

6. During the life of the project, the project owner shall provide to the CPM all monitoring reports, complaints, studies and other relevant data within 10 days of being received by the project owner.

Verification The project owner shall do all of the following:

1. At least six weeks prior to the start of construction activities, a Groundwater Monitoring, Mitigation, and Reporting Plan (GMMRP) shall be submitted to Inyo County Water Department, the Bureau of Land Management Nevada and California state leads for Soil, Water, Air and Riparian Programs, and the BLM Southern Nevada District and Barstow District Hydrologist and Botanist for review and comment and the CPM for review and approval.

2. At least 30 days prior to operation of the site groundwater supply wells for construction, the project owner shall submit to the CPM a comprehensive report presenting all the baseline groundwater level and quality data required by section A of **WATER SUPPLY-4** above. The report shall include the following:

   a. An assessment of pre-project groundwater quality with groundwater samples analyzed for TDS, chloride, nitrates, major cations and anions, and oxygen-18 and deuterium isotopes. These analyses, and particularly the stable isotope data, can be useful for identifying partially evaporated water sources and assessing their contributions to the quality of water produced by wells.

   b. The data shall be tabulated, summarized, and submitted to the CPM. The data summary shall include the estimated range (minimum and maximum values), average, and median for each constituent analyzed.

3. During project construction, the project owner shall submit to the CPM reports presenting all the data and information required in item B above. The reports shall be provided 30 days following the end of the monitoring period. The project owner shall also submit to the CPM all calculations and assumptions made in development of the report data and interpretations.

4. No later than March 31 of each year of construction or 60 days prior to project operation, the project owner shall provide to the CPM for review and approval, documentation showing that any mitigation to private well owners during project construction was satisfied, based on the requirements of the property owner as determined by the CPM.

5. During project operation, the project owner shall submit to the CPM, applicable monthly, quarterly, semiannual, and annual reports presenting all the data and information required in section C above. Reports shall be submitted to the CPM 30 days following the end of the monitoring period. The fourth quarter report shall serve as the annual report and shall be provided on January 31 in the following year. The project owner shall submit to the CPM all calculations and assumptions made in development of report data and interpretations, calculations, and assumptions used in development of any reports.

After the first five year operational and monitoring period, the project owner shall submit a five year monitoring report to the CPM that includes all monitoring data collected and a summary of the findings. The CPM shall determine if the water level measurements and sampling frequencies should be revised.

GROUNDWATER PUMPING COST CALCULATION

WATER SUPPLY-5 Where it is determined that the project owner shall reimburse a private well owner for increased energy costs identified as a result of analysis performed in Condition of Certification **WATER SUPPLY-4,** the project owner shall calculate the compensation owed to any owner of an impacted well as described below.

Increased cost for energy =	change in lift/total system head x total energy consumption x costs/unit of energy

Where:

change in lift (ft) =	calculated change in water level in the well resulting from project
total system head (ft) =	elevation head + discharge pressure head
elevation head (ft) =	difference in elevation between wellhead discharge pressure gauge and water level in well during pumping.
discharge pressure head (ft) =	pressure at wellhead discharge gauge (psi) X 2.31

The project owner shall submit to the CPM for review and approval the documentation showing which well owners must be compensated for increased energy costs and that the proposed amount is sufficient compensation to comply with the provisions of this condition.

A. Any reimbursements (either lump sum or annual) to impacted well owners shall be only to those well owners whose wells were in service within six months of the Commission decision and within a 5-mile radius of the project site.

B. The project owner shall notify all owners of the impacted wells within one month of the CPM approval of the compensation analysis for increase energy costs.

C. Compensation shall be provided on either a one-time lump-sum basis, or on an annual basis, as described below.

Annual Compensation: Compensation provided on an annual basis shall be calculated prospectively for each year by estimating energy costs that will be incurred to provide the additional lift required as a result of the project. With the permission of the impacted well owner, the project owner shall provide

energy meters for each well or well field affected by the project. The impacted well owner to receive compensation must provide documentation of energy consumption in the form of meter readings or other verification of fuel consumption. For each year after the first year of operation, the project owner shall include an adjustment for any deviations between projected and actual energy costs for the previous calendar year.

One-Time Lump-Sum Compensation: Compensation provided on a one-time lump-sum basis shall be based on a well-interference analysis, assuming the maximum project-pumping rate of 163 acre-feet per year. Compensation associated with increased pumping lift for the life of the project shall be estimated as a lump sum payment as follows:

A. The current cost of energy to the affected party considering time of use or tiers of energy cost applicable to the party's billing of electricity from the utility providing electric service, or a reasonable equivalent if the party independently generates their electricity;

B. An annual inflation factor for energy cost of 3 percent; and

C. A net present value determination assuming a term of 30 years and a discount rate of 9 percent;

Verification: The project owner shall do all of the following:

1. No later than 30 days after CPM approval of the well drawdown analysis, the project owner shall submit to the CPM for review and approval all documentation and calculations describing necessary compensation for energy costs associated with additional lift requirements.

2. The project owner shall submit to the CPM all calculations, along with any letters signed by the well owners indicating agreement with the calculations, and the name and phone numbers of those well owners that do not agree with the calculations. Compensation payments shall be made by March 31 of each year of project operation or, if lump-sum payment is selected, payment shall be made by March 31 of the first year of operation only. Within 30 days after compensation is paid, the project owner shall submit to the CPM a compliance report describing compensation for increased energy costs necessary to comply with the provisions of this condition.

GROUND SUBSIDENCE MONITORING AND ACTION PLAN

WATER SUPPLY–6 One monument monitoring station per production well or a minimum of three stations shall be constructed to measure potential inelastic subsidence that may alter surface characteristics of the PVGB and affect structures near the proposed production wells. The project owner shall:

A. Prepare and submit a Subsidence Monitoring Plan (SMP), including all calculations and assumptions. The plan shall include the following elements:

1. Construction diagrams of the proposed monument monitoring stations including size and description, planned depth, measuring points, and protection measures;

2. Map depicting locations (minimum of three) of the planned monument monitoring stations;

3. Monitoring program that includes monitoring frequency, thresholds of significance, reporting format.

B. Prepare annual reports commencing three (3) months following commencement of groundwater production during construction and operations.

1. The reports shall include presentation and interpretation of the data collected including comparison to the thresholds developed in Item C.

C. Prepare a Mitigation Action Plan that details the following:

1. Thresholds of significance for implementation of proposed action plan based on monitoring station data;

a. Subsidence shall not be allowed to damage existing structures either on or off the site or alter the appearance or use of the structure;

b. Any subsidence that may occur shall not be allowed to alter natural drainage patterns or permit the formation of playas or lakes;

c. If any subsidence violates (a) or (b) the project owner shall investigate the need to immediately modify or cease pumping for project operations until the cause is interpreted and subsidence caused by project pumping abates and the structures and/or drainage patterns are stabilized and corrected.

2. The project owner shall prepare an Action Plan that details proposed actions by the applicant in the event thresholds are achieved during the monitoring program

The project owner shall submit the Ground Subsidence Monitoring and Action Plan that is prepared by an Engineering Geologist registered in the State of California thirty (30) days prior to the start of extraction of groundwater for construction or operation.

Verification: The project owner shall do all of the following:

1. At least thirty (30) days prior to project construction, the project owner shall submit to the CPM, a comprehensive report presenting all the data and information required in item A above.

2. During project construction and operations, the project owner shall submit to the CPM quarterly reports presenting all the data and information required in item B above.

3. The project owner shall submit to the CPM all calculations and assumptions made in development of the report data and interpretations.

4. After the first five (5) years of the monitoring period, the project owner shall submit a 5-year monitoring report to the CPM that submits all monitoring data collected and provides a summary of the findings. The CPM shall determine if the Ground Subsidence Monitoring and Action Plan frequencies should be revised..

NON-TRANSIENT, NON-COMMUNITY WATER SYSTEM

WATER SUPPLY-7 The project is subject to the requirements of California Code of Regulations, Title 22, Article 3, Sections 64400.80 through 64445 (22 CCR § 64400.80 – 64445) for a non-transient, non-community water system (serving 25 people or more for more than six months). The project owner shall submit water system plans to Inyo County Environmental Health Services for review and approval. In addition, the system will require periodic monitoring consistent with **WATER SUPPLY-4**, for various bacteriological, inorganic and organic constituents.

Verification: The project owner shall obtain a permit to operate a non-transient, non-community water system with the Inyo County Environmental Health Services at least sixty (60) days prior to commencement of construction at the site. In addition, the project owner shall submit to the CPM a monitoring and reporting plan for production wells operated as part of the domestic water supply system prior to plant operations. The plan shall include reporting requirements including monthly, quarterly, and annual submissions.

The project owner shall designate a California Certified Water Treatment Plant Operator as well as the technical, managerial, and financial requirements as prescribed by State law. The project owner shall supply the CPM updates on an annual basis regarding monitoring requirements, any submittals to the Inyo County Environmental Health Services, and proof of annual renewal of the operating permit.

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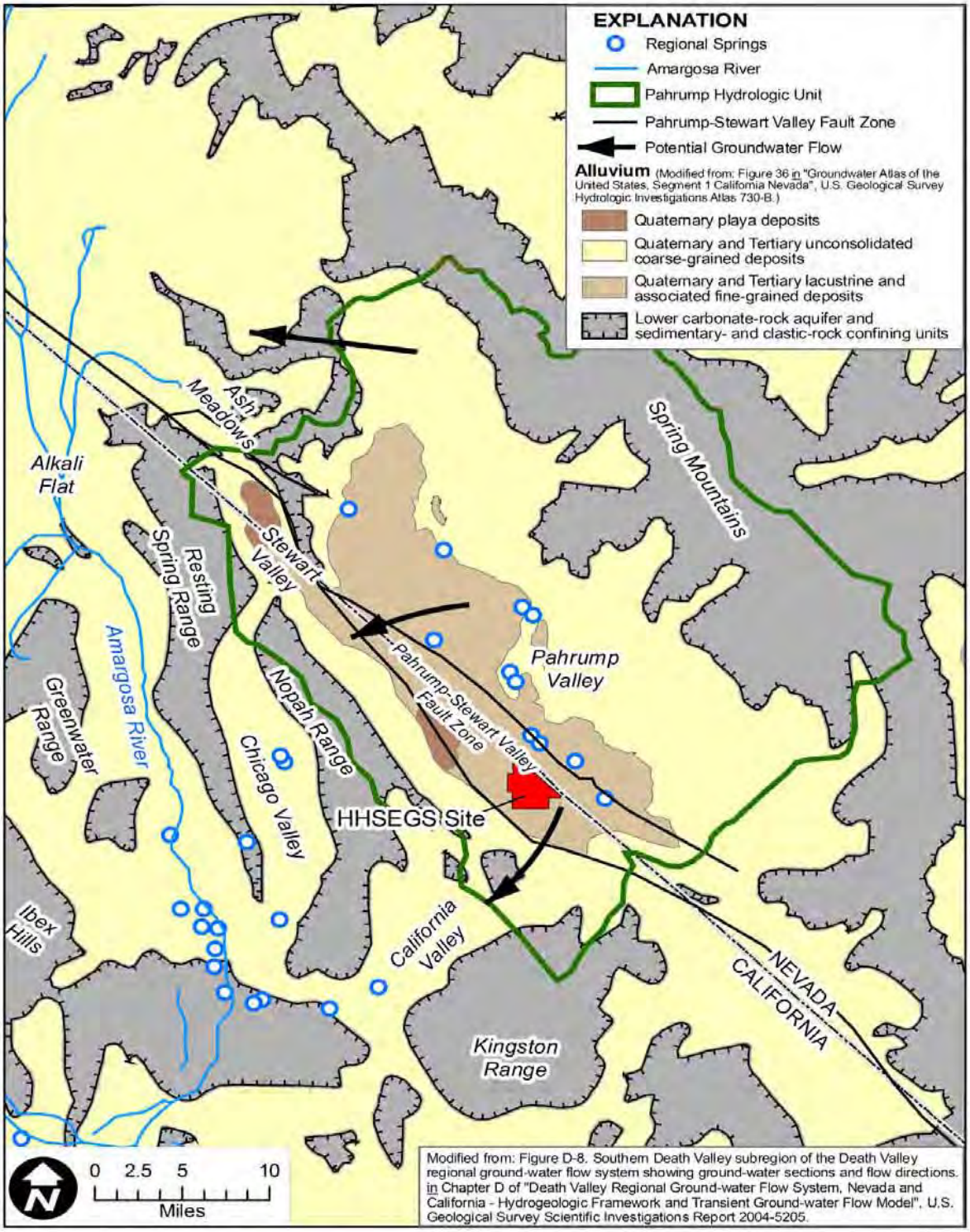
WATER SUPPLY - FIGURE 1
Hidden Hills Solar Electric Generating System (HHSEGS)

The Great Basin is a large-scale, topographically closed surface water basin. The area is also aligned with the Basin and Range geologic province, which is characterized by extension, and an alternating mountain/valley-fill landscape.

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE:USGS, 2011

WATER SUPPLY - FIGURE 2
Hidden Hills Solar Electric Generating System (HHSEGS)

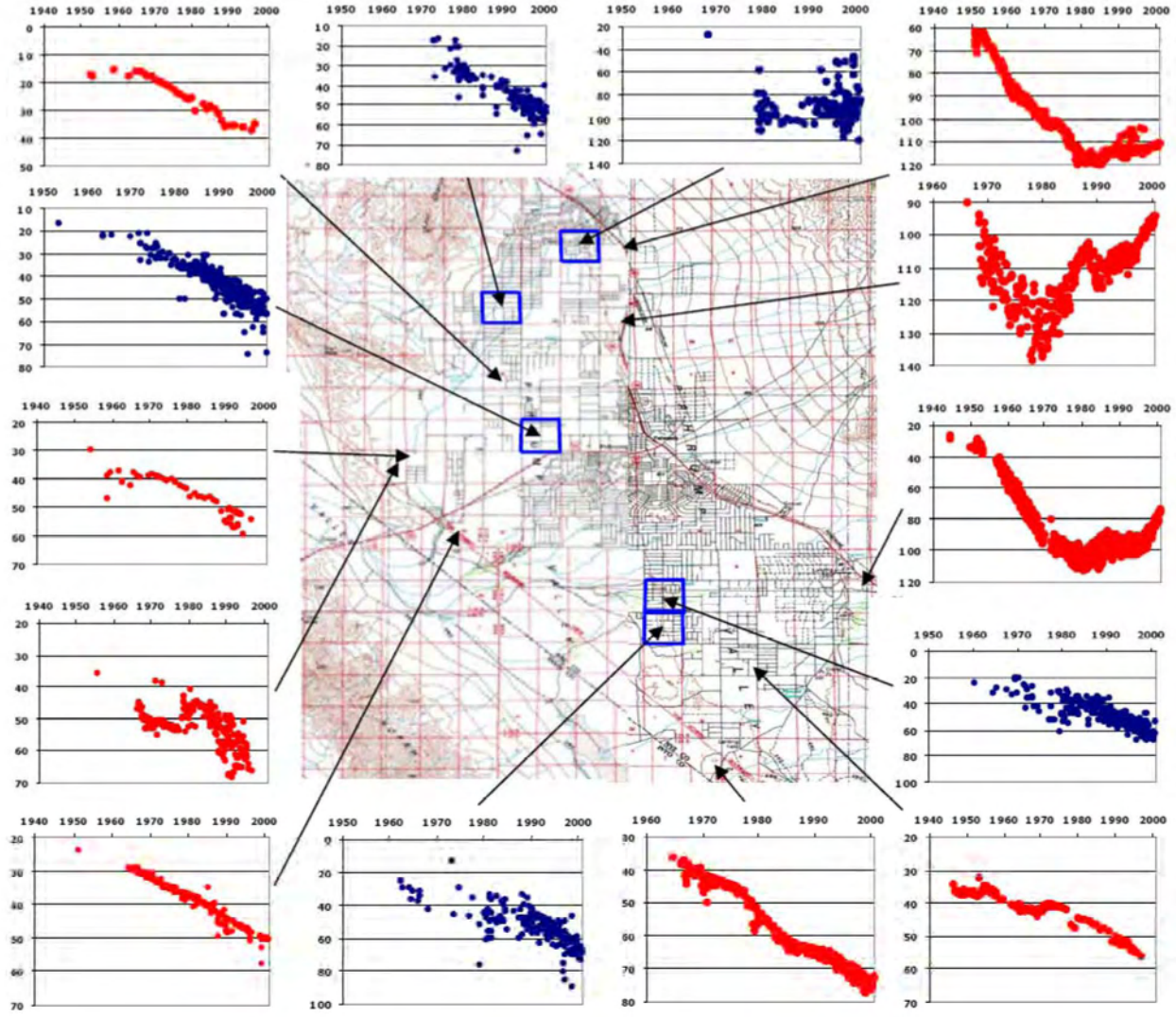
The Pahrump Valley and vicinity.



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE:Faunt[B] et al., 2004

WATER SUPPLY - FIGURE 3
Hidden Hills Solar Electric Generating System (HHSEGS)

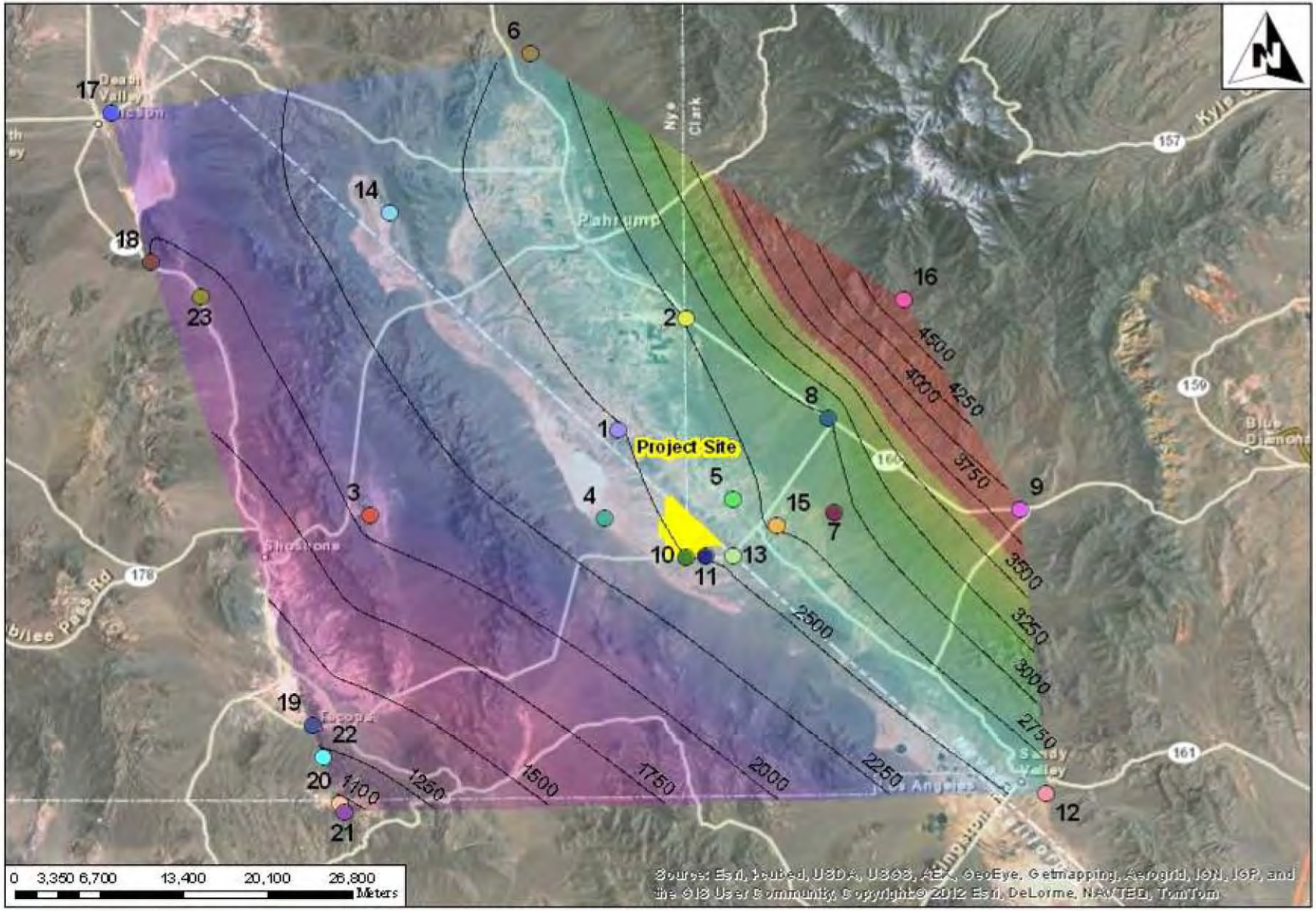
Water levels in northern Pahrump Valley between 1940 and 2000. Vertical axes represent feet below land surface.



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: Buqo, 2004

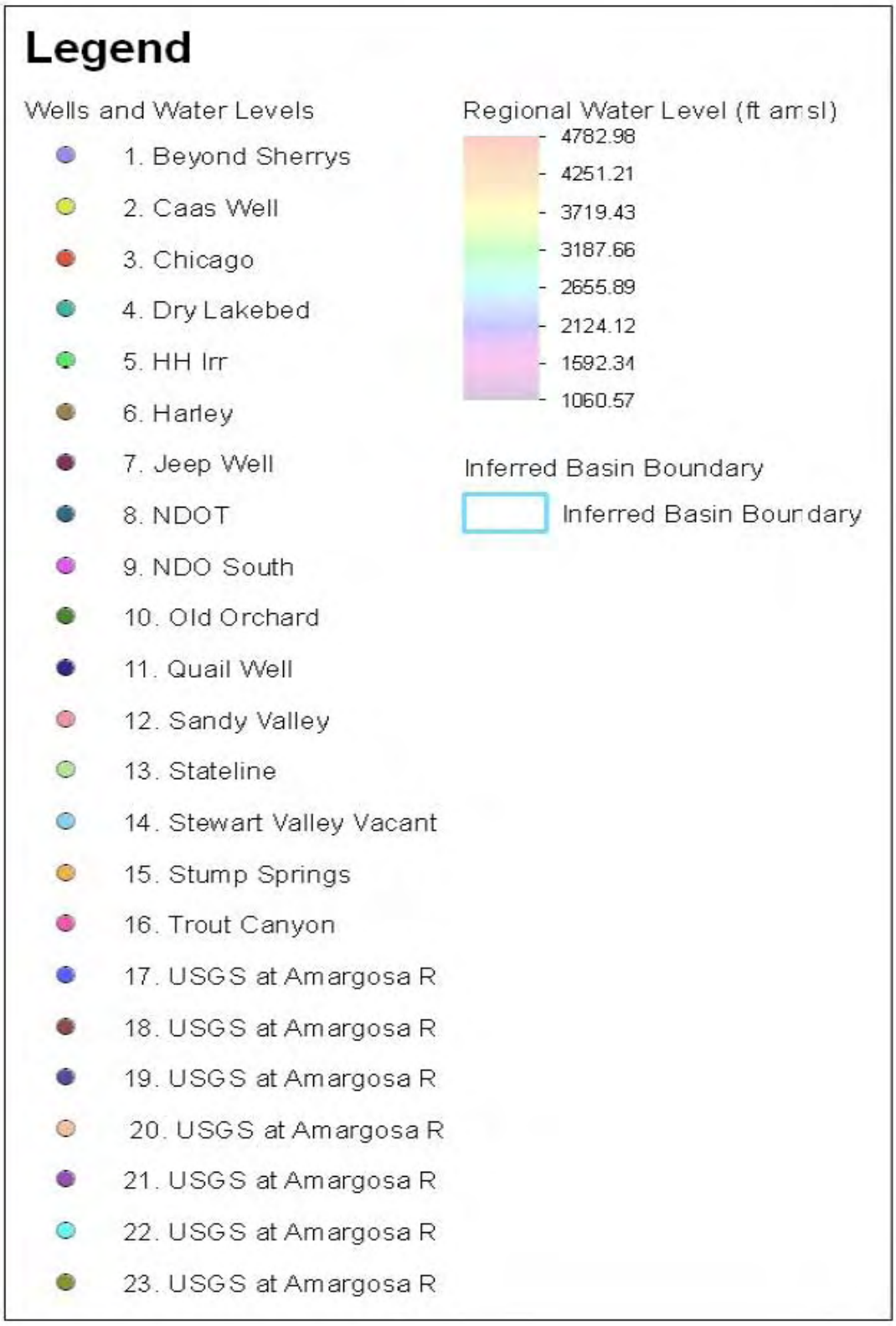
WATER SUPPLY - FIGURE 4

Hidden Hills Solar Electric Generating System (HHSEGS) - Inferred potentiometric surface for Pahrump Valley, based on 2011 water level data, extrapolated a little north, to the Amargosa River in the west, and Sandy Valley to the south (see **WATER SUPPLY: Figure 5** for Legend).



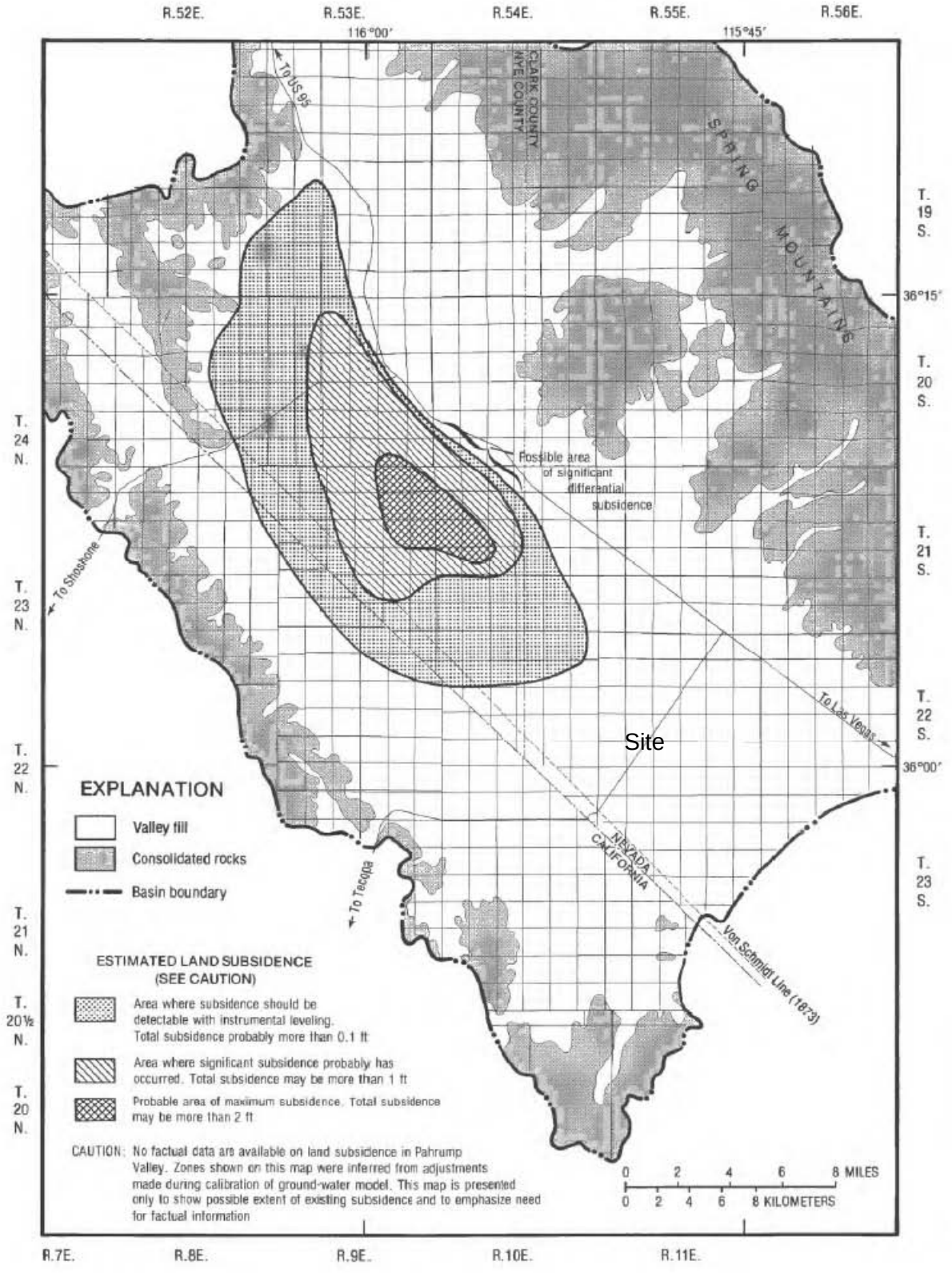
WATER SUPPLY - FIGURE 5

Hidden Hills Solar Electric Generating System (HHSEGS)– Legend for **WATER SUPPLY: Figure 4**.



WATER SUPPLY - FIGURE 6

Hidden Hills Solar Electric Generating System (HHSEGS) – Estimated land subsidence in Pahrump Valley.

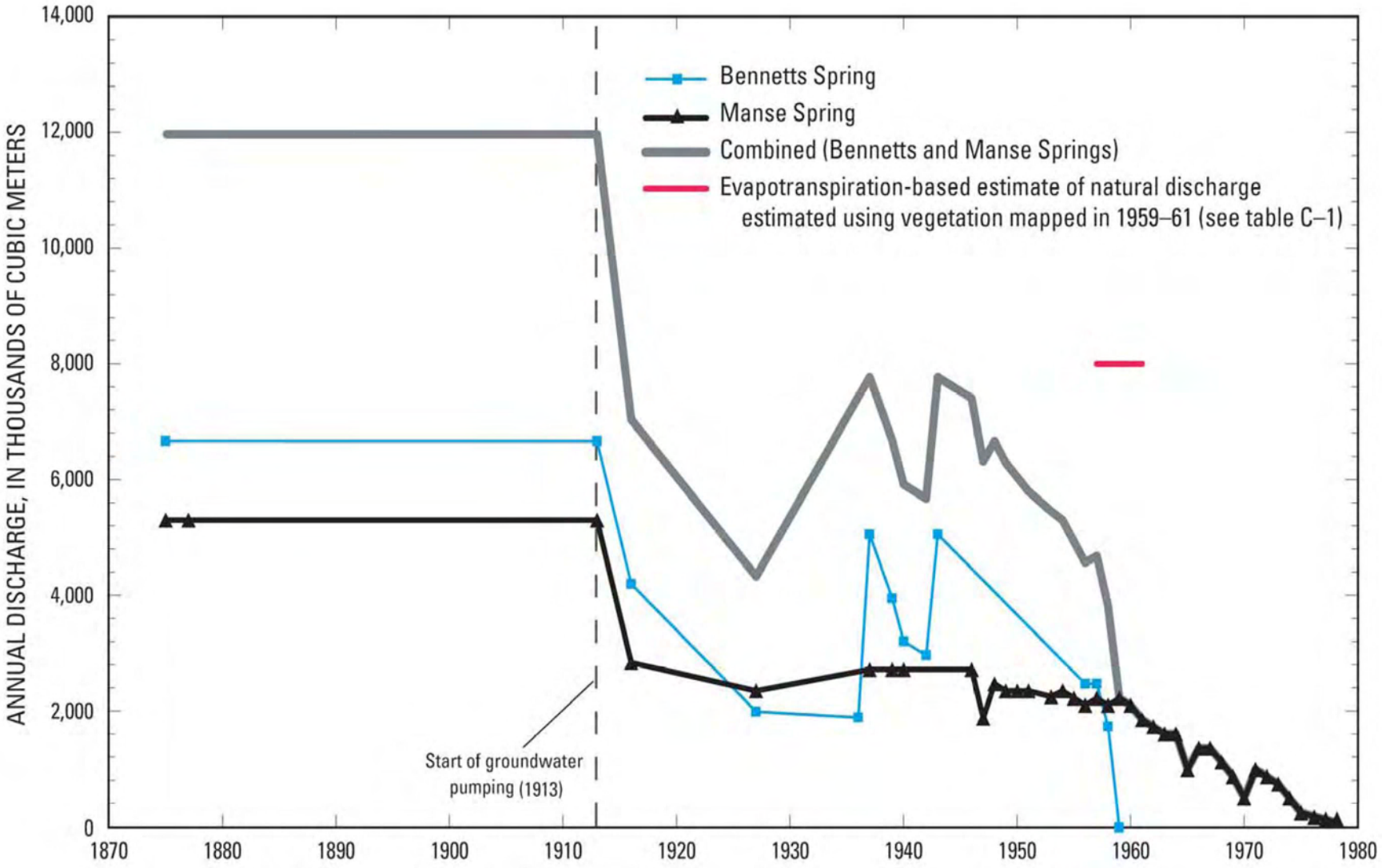


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE:Harrill, 1986

WATER SUPPLY - FIGURE 7

Hidden Hills Solar Electric Generating System (HHSEGS) - Annual discharge estimates for Bennetts and Manse Spring, for years 1870 through 1980.



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Belcher et al., 2004

WATER SUPPLY - FIGURE 8

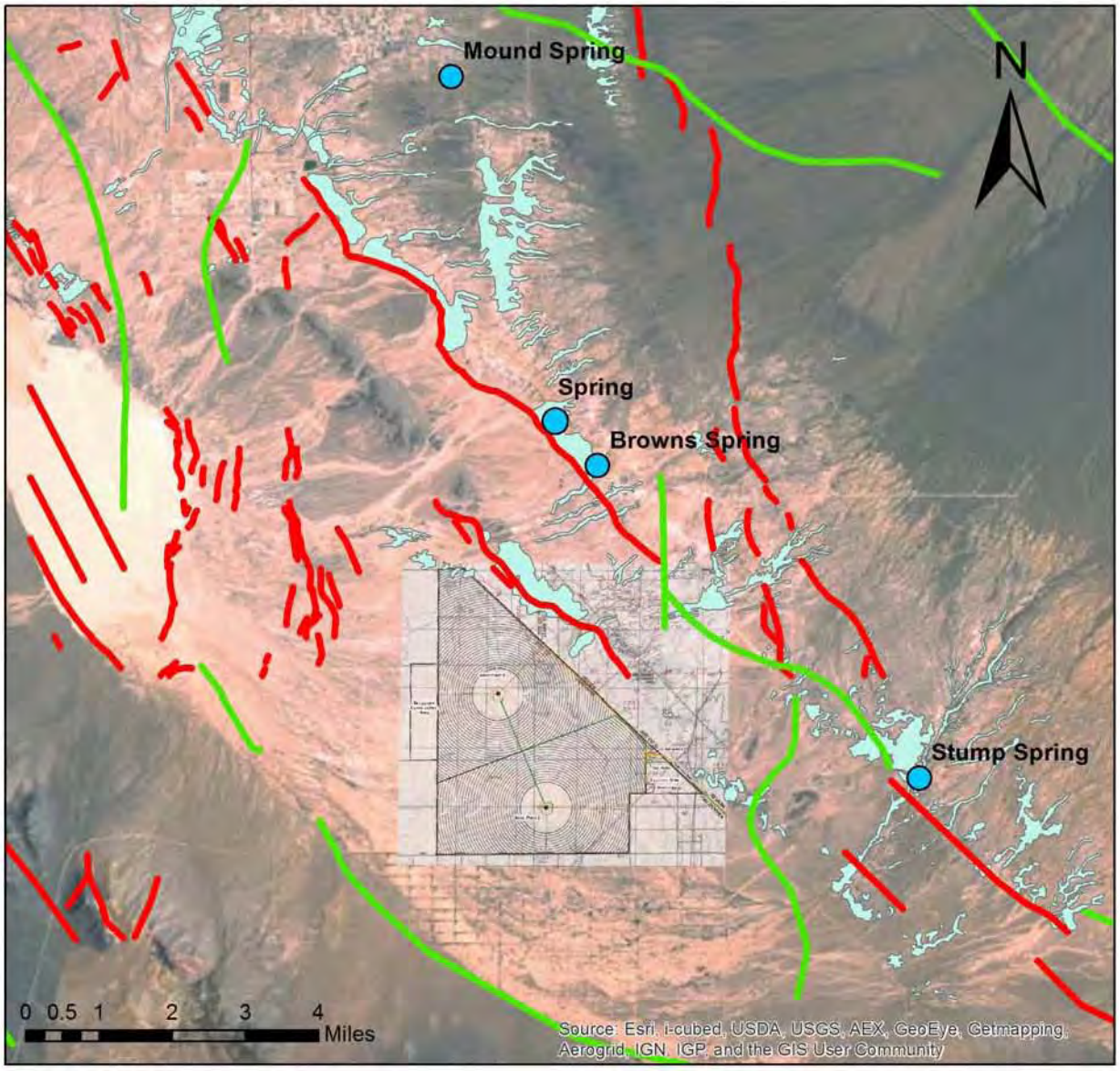
Hidden Hills Solar Electric Generating System (HHSEGS) – Mesquite stands in the vicinity of the project (Malmburg, 1967).

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Malmburg, 1967

WATER SUPPLY - FIGURE 9

Hidden Hills Solar Electric Generating System (HHSEGS) – Mesquite-acacia habit mapped by BLM staff in the 1990s.

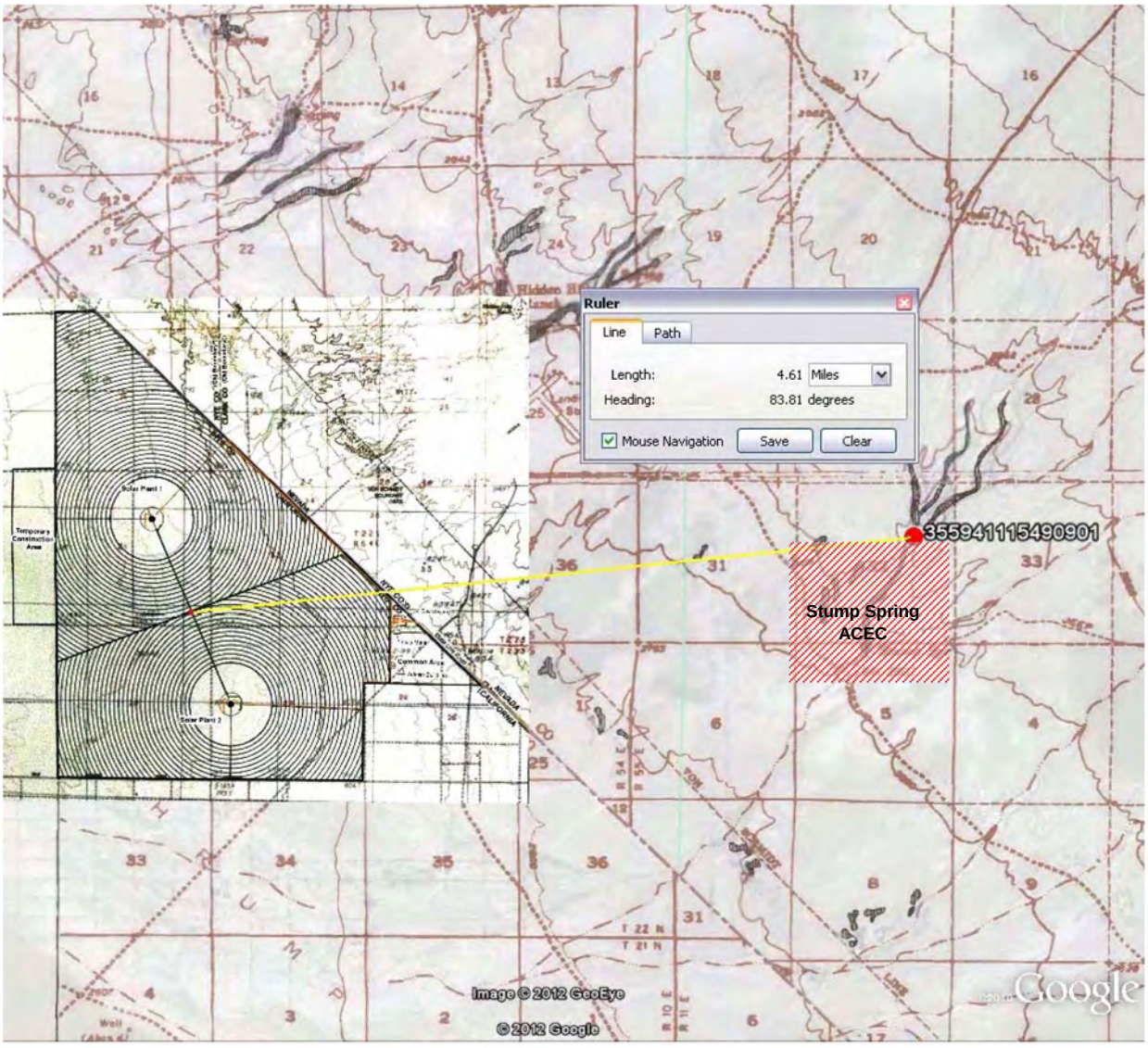


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM, Workman et al., 2002.

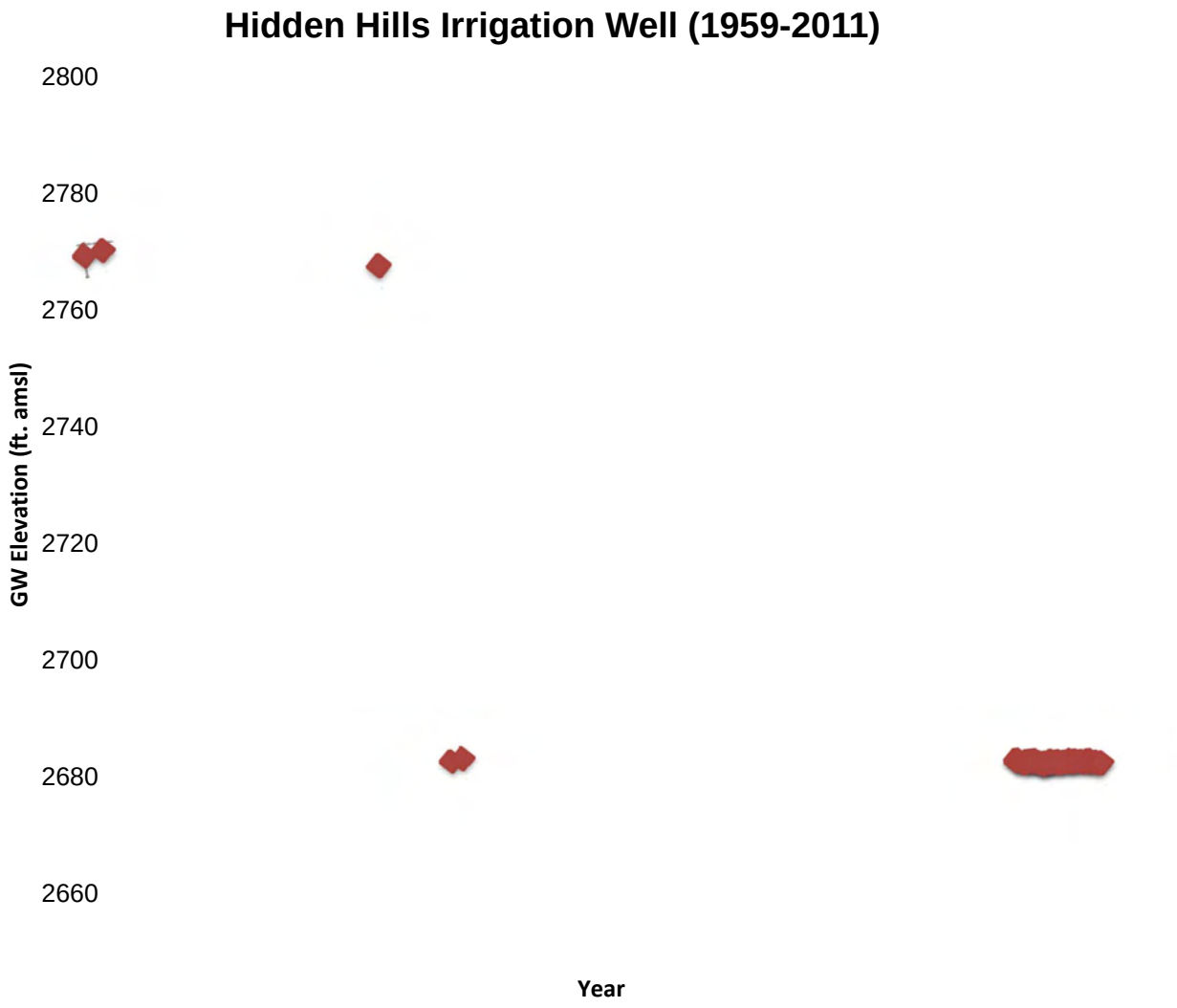
WATER SUPPLY - FIGURE 10
Hidden Hills Solar Electric Generating System (HHSEGS)

The Stump Springs Area of Critical Environmental Concern is about 4 miles from the center of the project. The Stump Springs monitoring well is about 4.6 miles from the center of the project.



WATER SUPPLY - FIGURE 11
Hidden Hills Solar Electric Generating System (HHSEGS)

Water levels at the Hidden Hills Irrigation well between 1959 and 2011. The blue line represents the Sen's slope estimator. The slope of trendlineindicates that the decline in the well is equal to 0.25 feet per year.

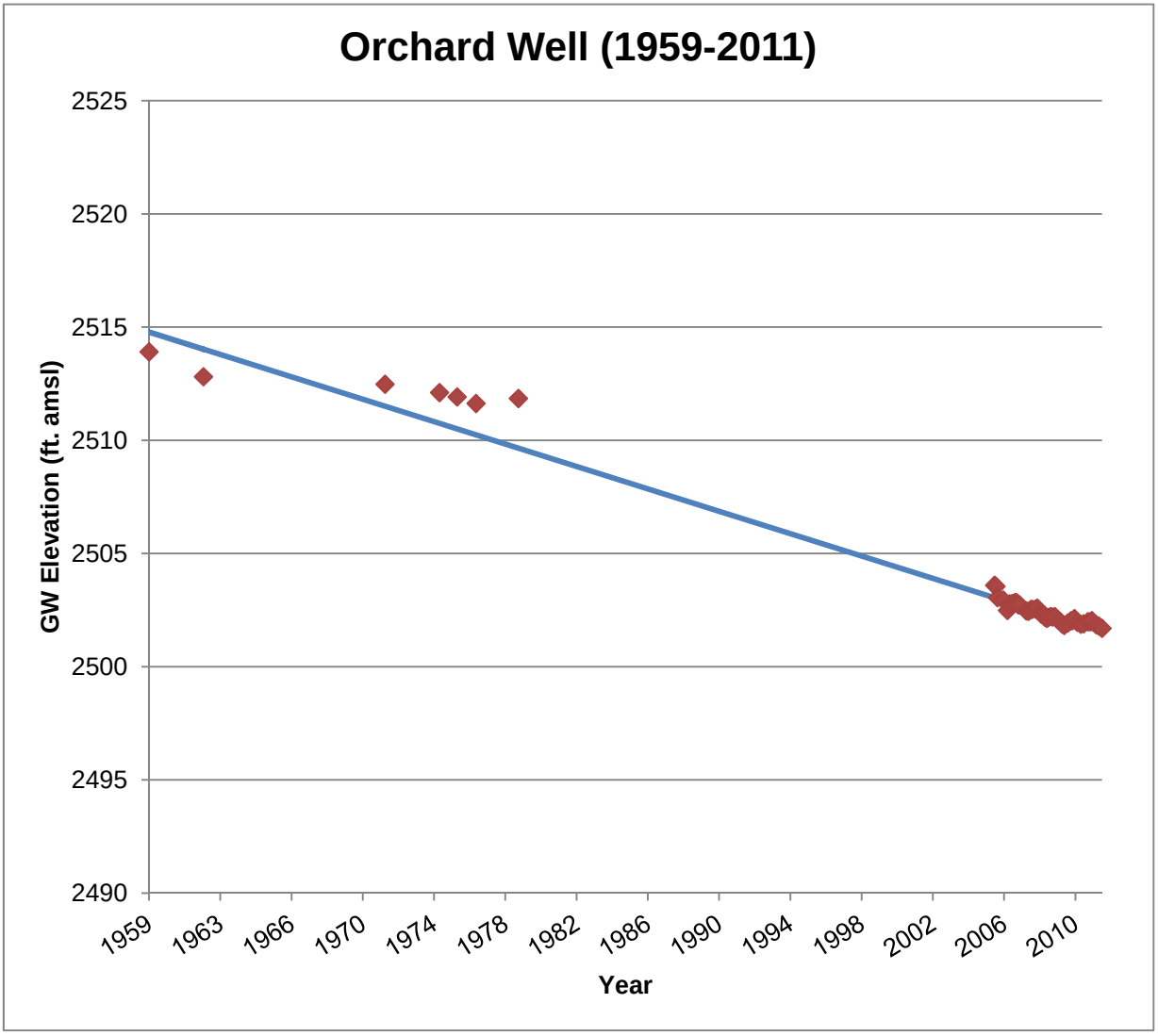


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE:USGS, 2011

WATER SUPPLY - FIGURE 12

Hidden Hills Solar Electric Generating System (HHSEGS)

Water levels at the Old Orchard well between 1959 and 2011. The blue line represents the Sen's slope estimator. The slope of trendline indicates that the decline in the well is equal to 0.37 feet per year (4.44 inches per year).



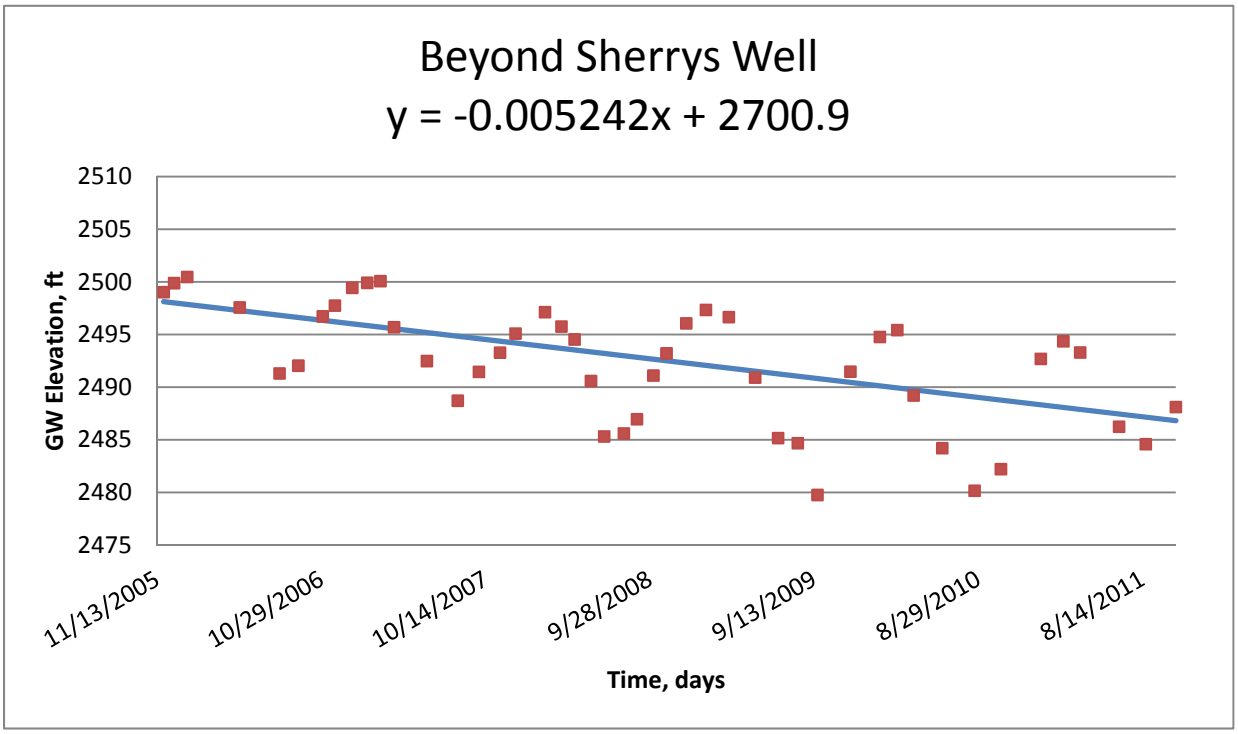
CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

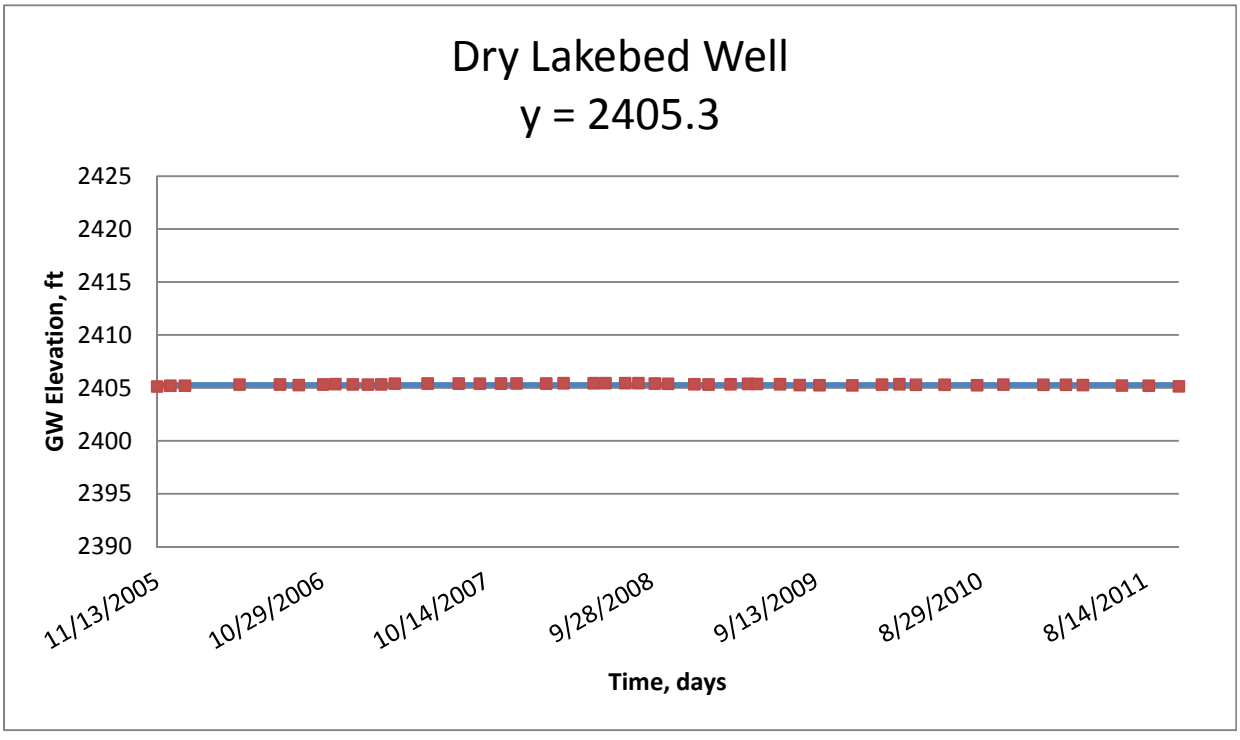
SOURCE: USGS, 2012

WATER SUPPLY - FIGURE 13

Hidden Hills Solar Electric Generating System (HHSEGS)

Water level trends in feet per day, between November 2005 and November 2011, for the Beyond Sherrys (-1.91 ft/yr) and Dry Lakebed (0.00 ft/yr) wells.





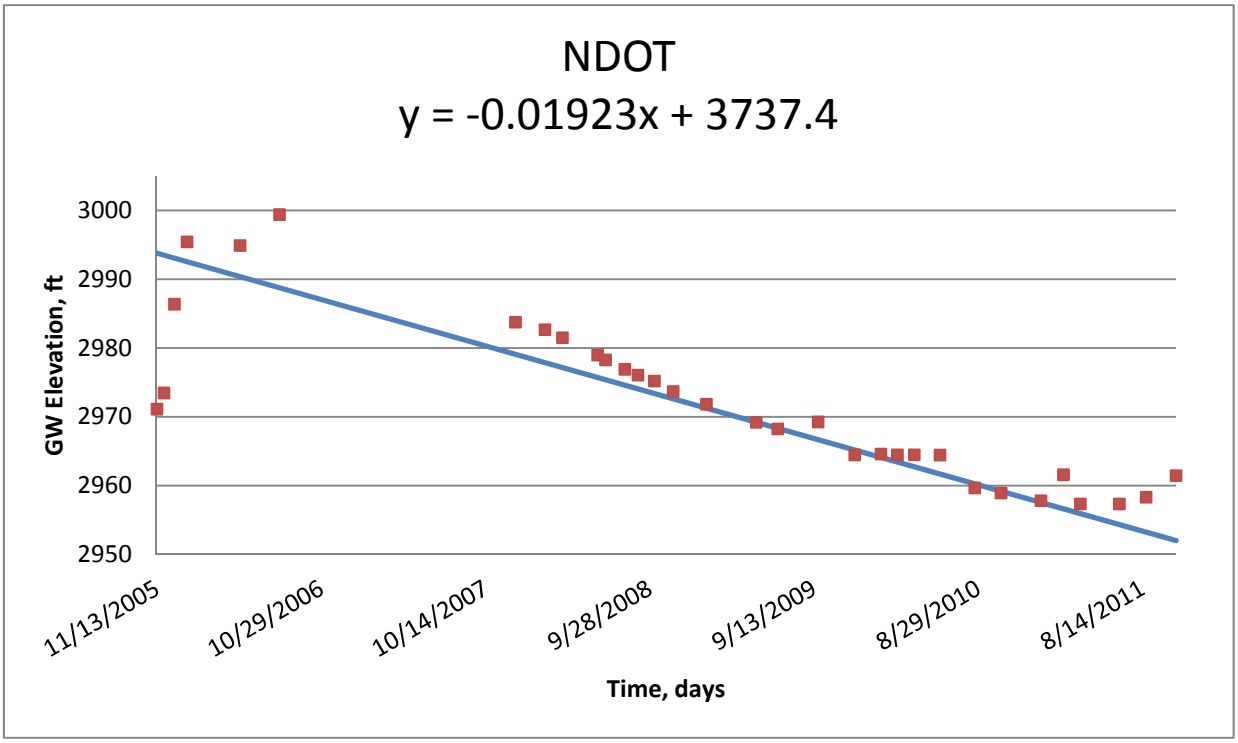
CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

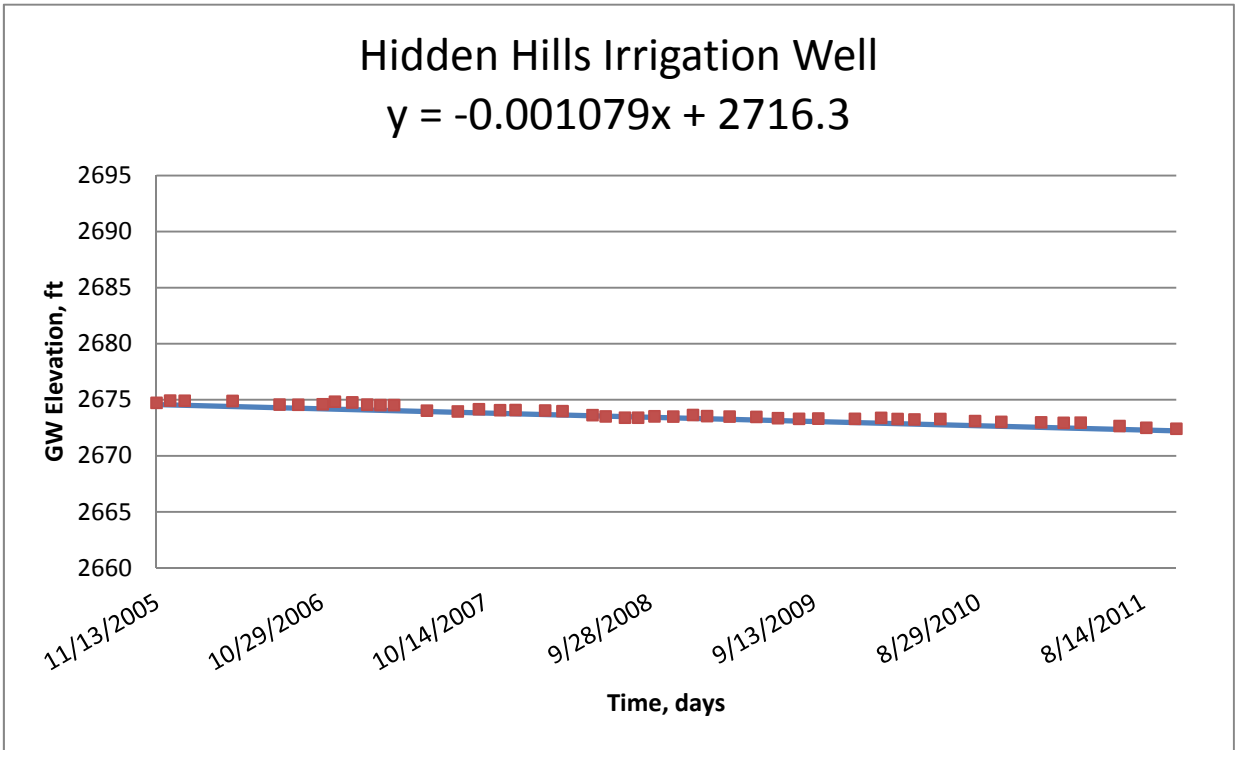
SOURCE: NWRPO

WATER SUPPLY - FIGURE 14

Hidden Hills Solar Electric Generating System (HHSEGS)

Water level trends in feet per day, between November 2005 and November 2011, for the NDOT (-7.00 ft/yr) and Hidden Hills (-0.39 ft/yr) irrigation wells.



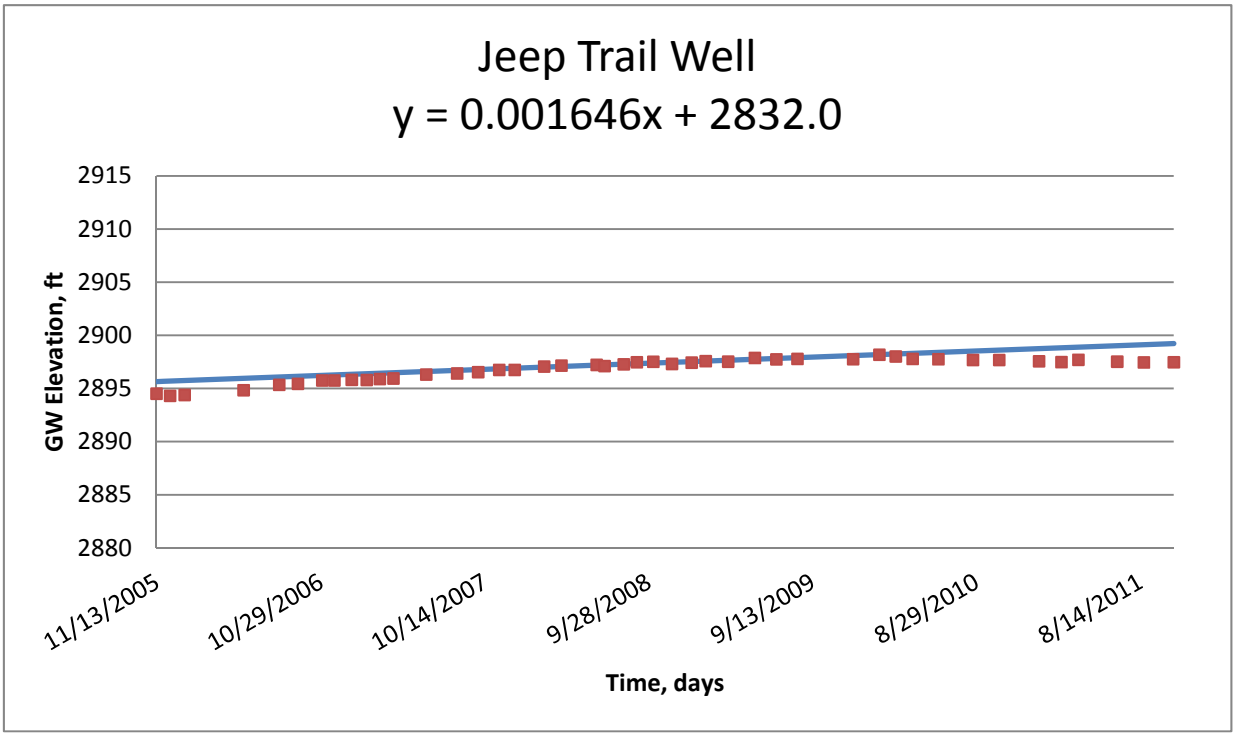


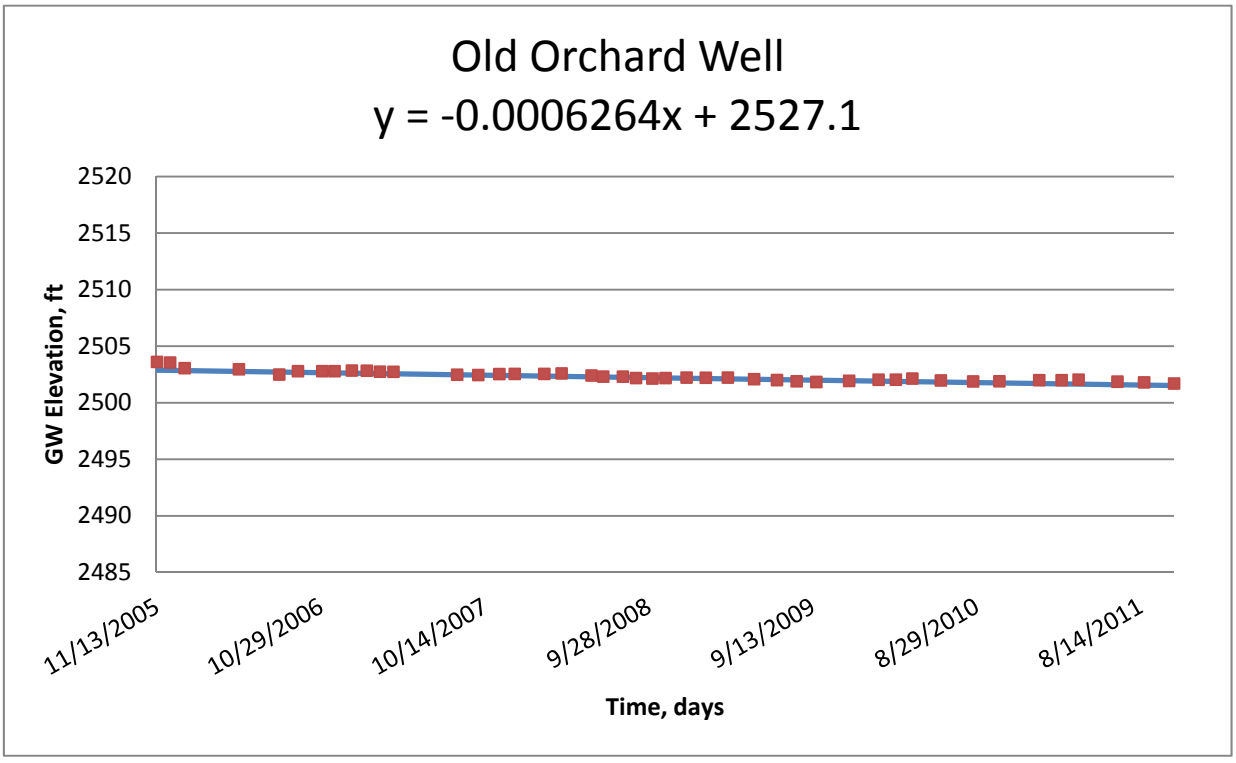
CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: NWRPO

WATER SUPPLY - FIGURE 15
Hidden Hills Solar Electric Generating System (HHSEGS)

Water level trends in feet per day, between November 2005 and November 2011, for the Jeep Trail (0.60 ft/yr) and Old Orchard wells (-0.23 ft/yr).

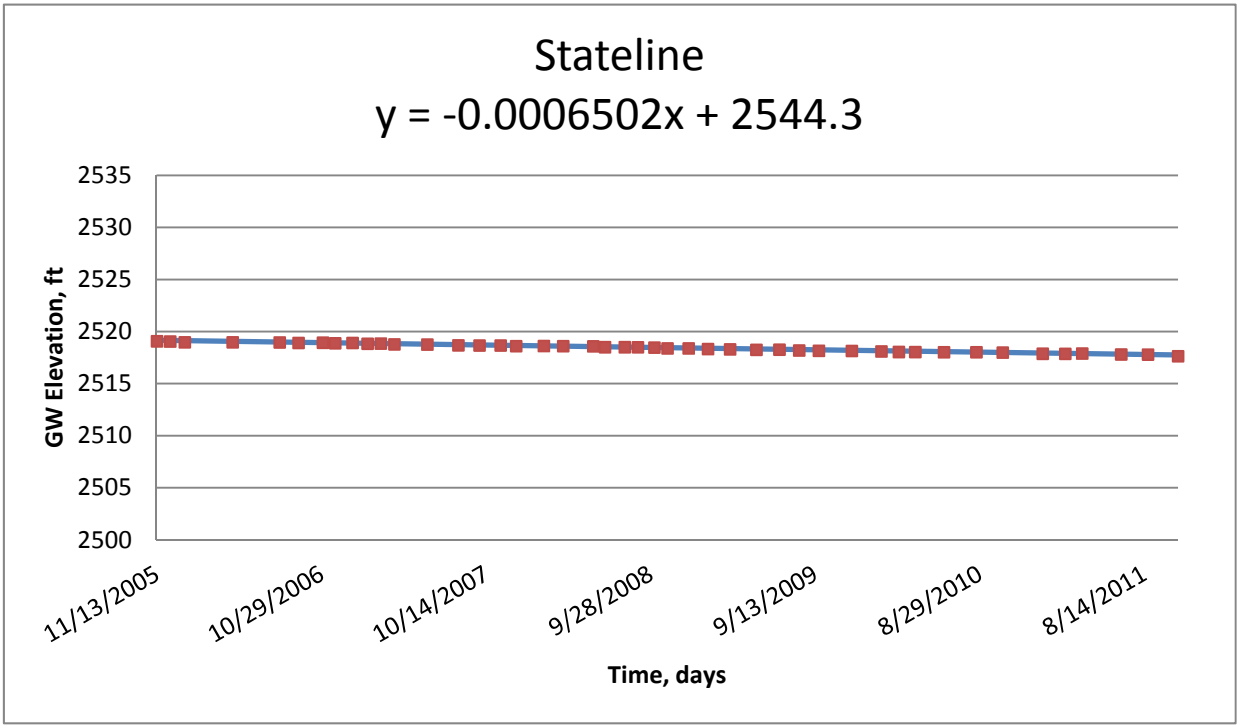


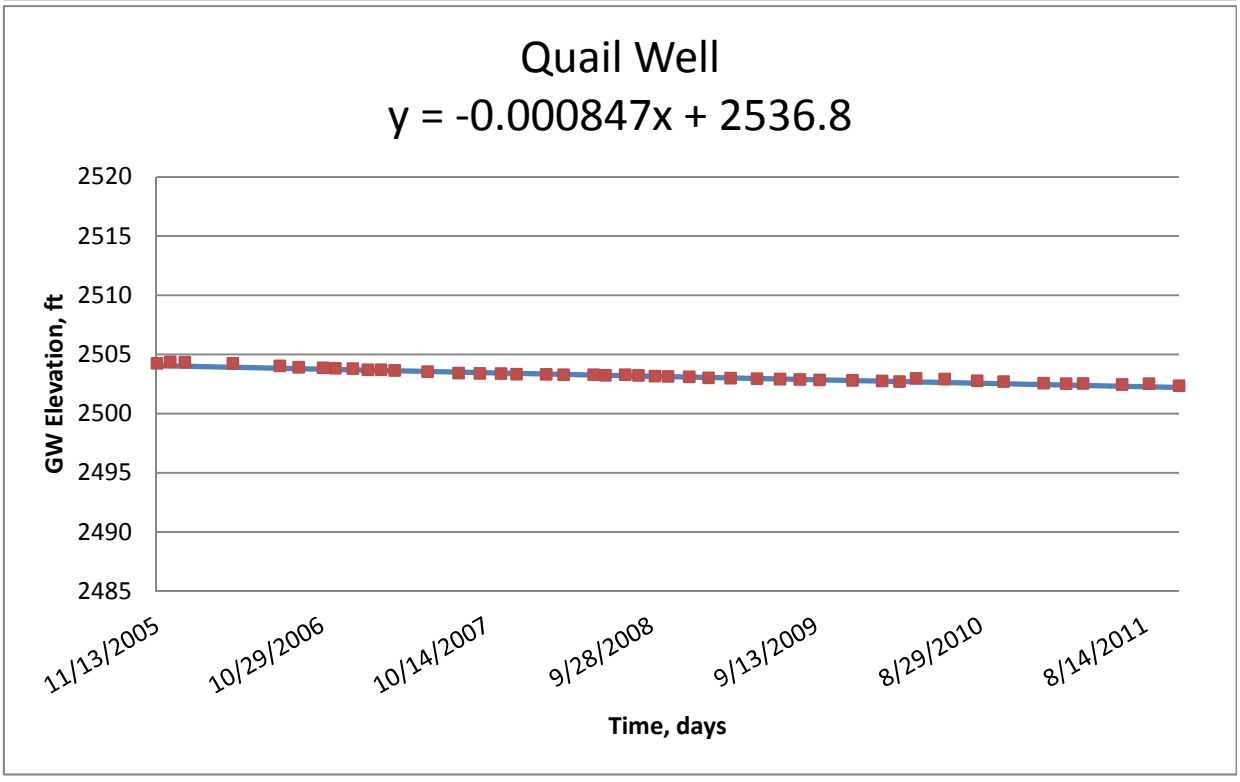


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: NWRPO

WATER SUPPLY - FIGURE 16
Hidden Hills Solar Electric Generating System (HHSEGS)

Water level trends in feet per day, between November 2005 and November 2011, for the Stateline (-0.24 ft/yr) and Quail (-0.31 ft/yr) wells.

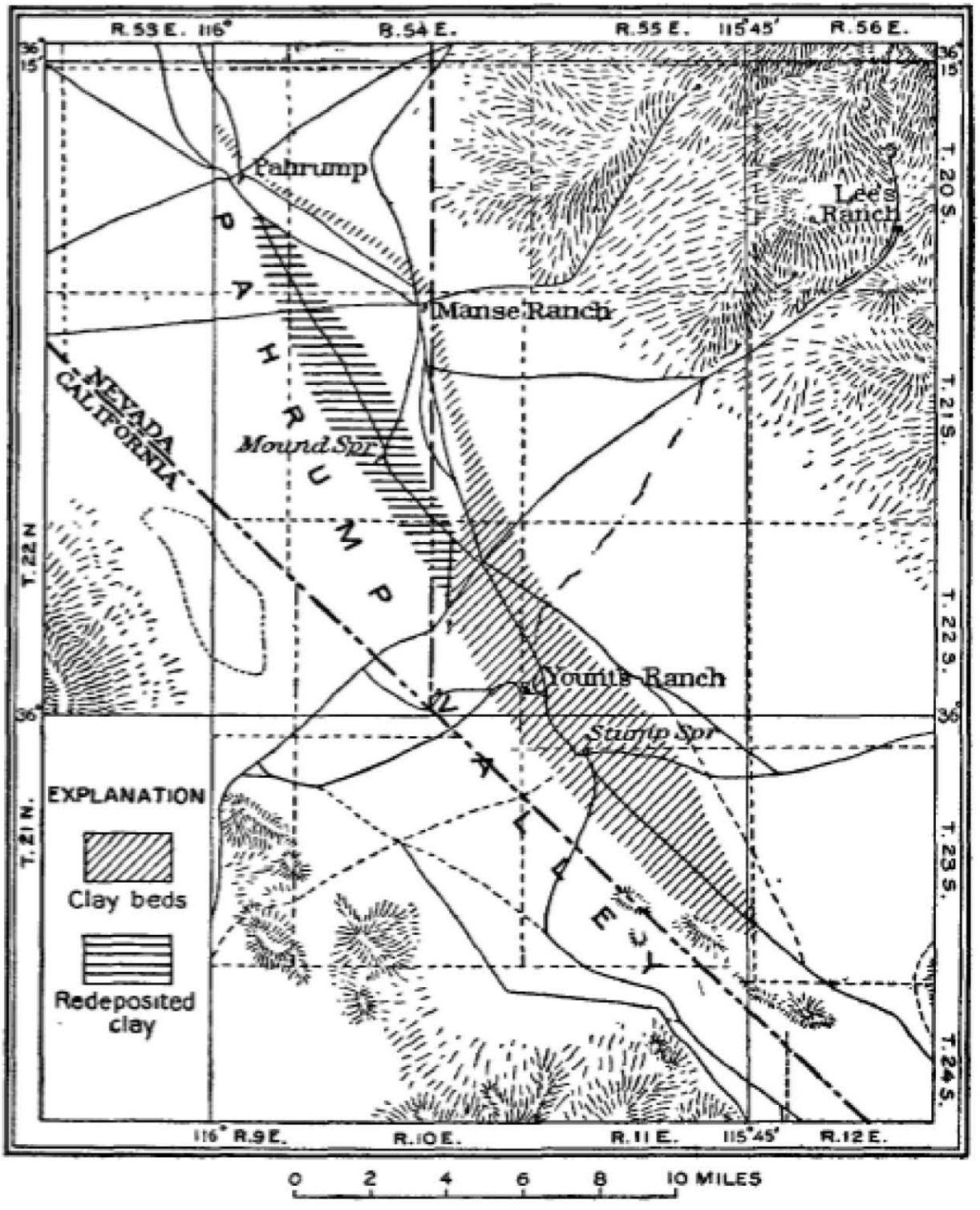




CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: NWRPO

WATER SUPPLY - FIGURE 17
Hidden Hills Solar Electric Generating System (HHSEGS)

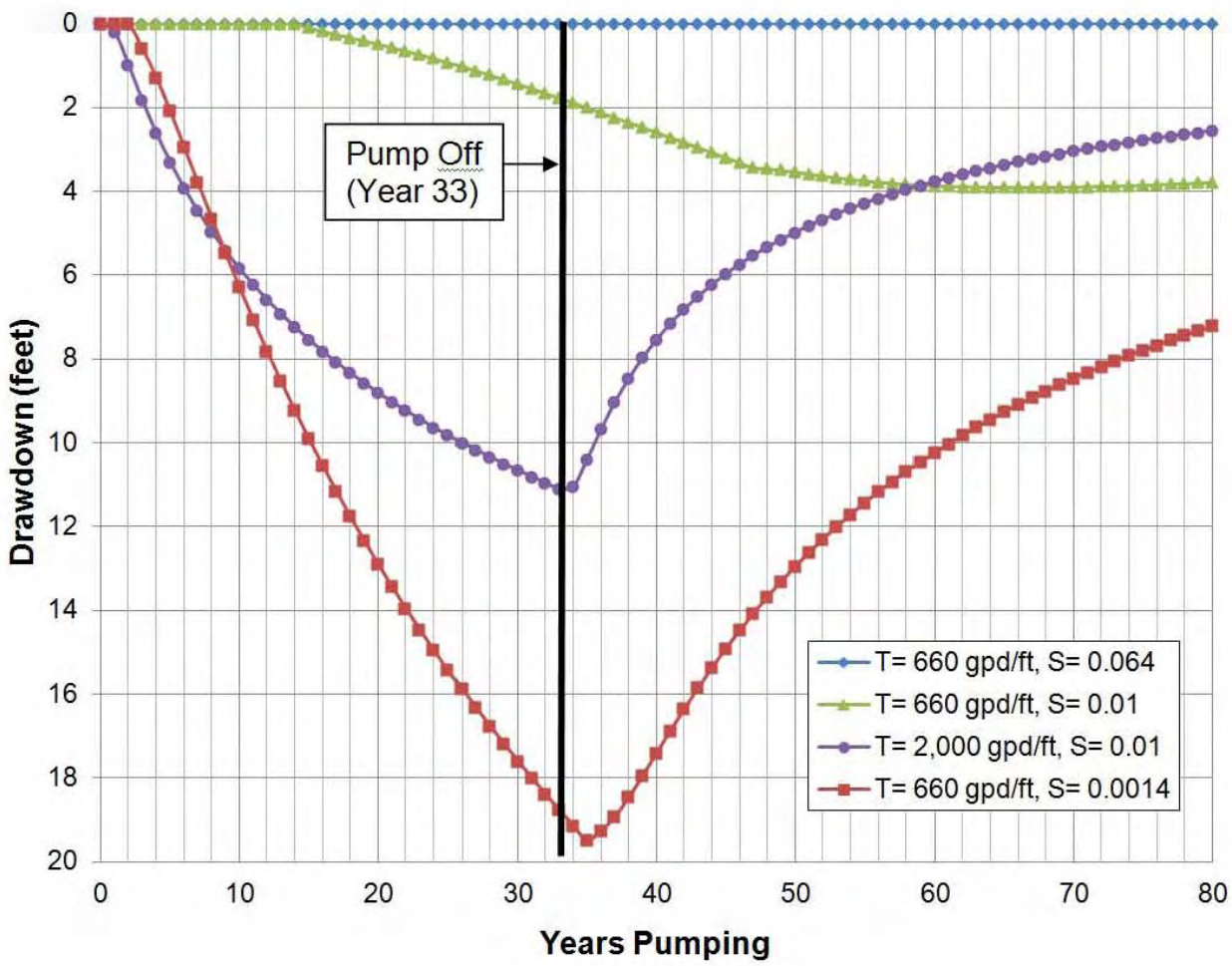
A significant exposure of clay bedding is observed around the Stump Springs region. The clay bedding is said to reach its maximum thickness of 50 feet near Stump Springs.



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: Grover, 1919

WATER SUPPLY - FIGURE 18
Hidden Hills Solar Electric Generating System (HHSEGS)

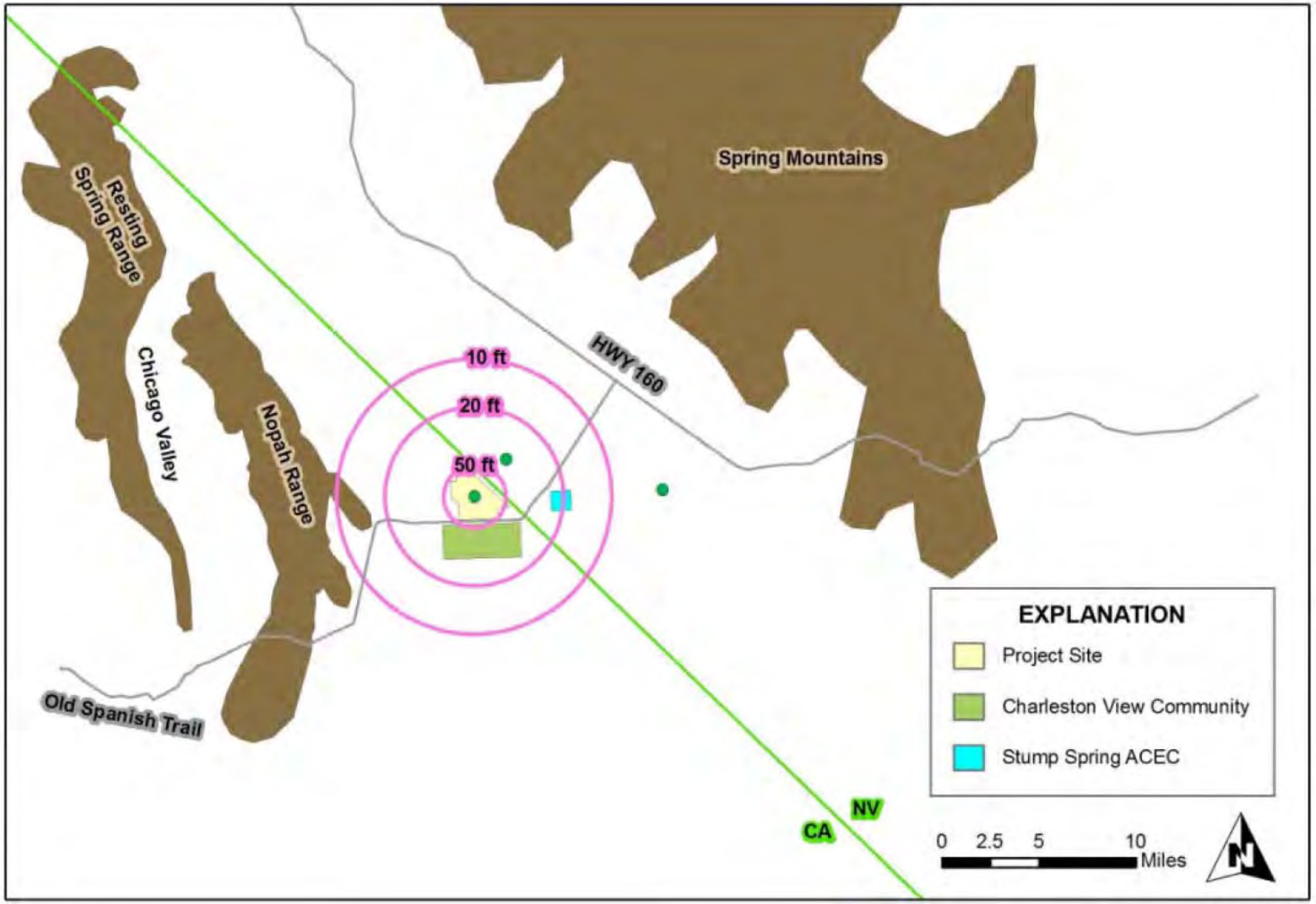
This graph shows potential impacts at Stump Spring (well) after 33 years of pumping at the rate of 87 gpm.



WATER SUPPLY – FIGURE 19

Hidden Hills Solar Electric Generating System (HHSEGS)

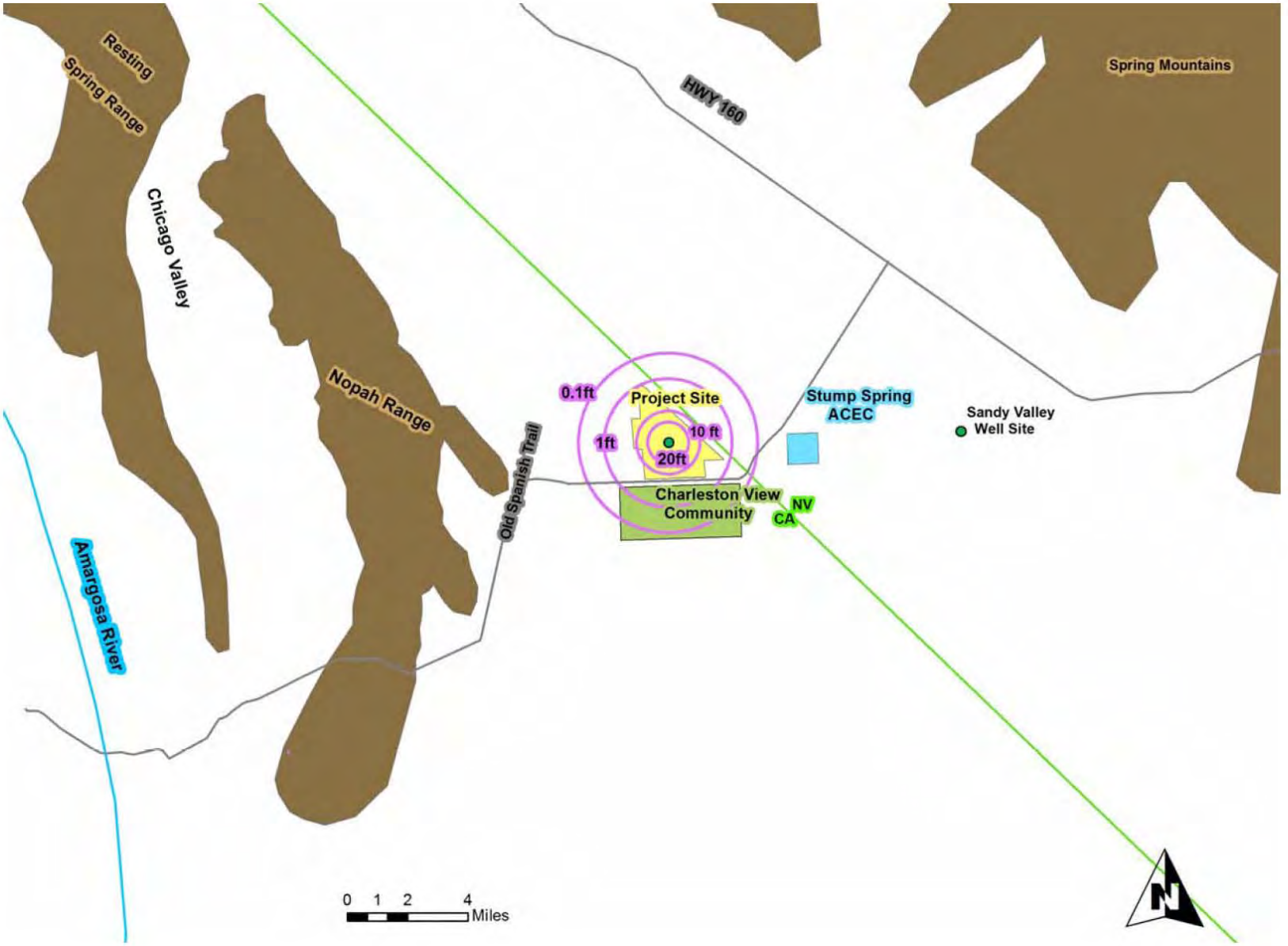
Estimated drawdown at groundwater dependent vegetation, worst-case scenario. Transmissivity: 660 gpd/ft, Storativity: 0.0014.



WATER SUPPLY - FIGURE 20

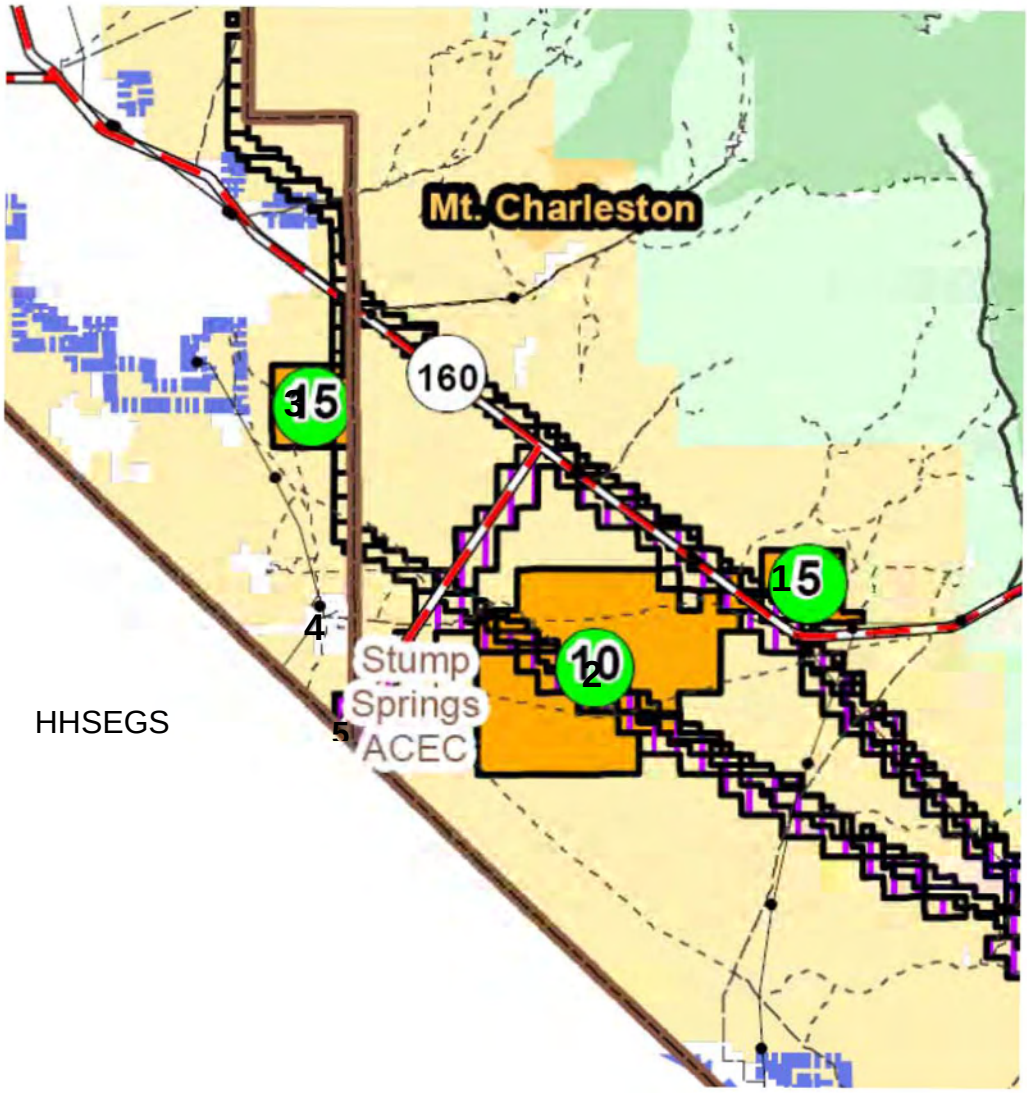
Hidden Hills Solar Electric Generating System (HHSEGS)

Estimated drawdown at groundwater dependent vegetation, best-case scenario. Transmissivity: 660 gpd/ft, Storativity: 0.064.



WATER SUPPLY - FIGURE 21

Hidden Hills Solar Electric Generating System (HHSEGS) –
Projects considered for cumulative impacts analysis



	Applicant	Project Name	County	Water Use (ac-ft/year)	Status
1	Pacific Solar Investments, Inc.	PSI Amargosa PV	Nye	0 (offsite)	DEIS-Plan Amendment
2	Bright Source Energy Solar Partners	Sandy Valley	Clark	170	application-POD
3	Element Power	PV Project	Clark	5-7	application-POD
4	Mary Lee Wiley Trust	Irrigation	Nye	211	NA
5	St. Therese Mission	Municipal	Inyo	18	NA

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

WATER SUPPLY - FIGURE 22

Hidden Hills Solar Electric Generating System (HHSEGS)

Proposed cumulative impacts of HHSEGS project. Transmissivity: 660 gpd/ft, Storativity: 0.0014.